

THE
MEDICAL GUIDE
TO THE
PRESERVATION OF HEALTH
AND THE
KNOWLEDGE OF DISEASE;
BEING AN OUTLINE OF THE PRINCIPLES OF
PHYSIOLOGY, PATHOLOGY, AND THERAPEUTICS.
DESIGNED FOR POPULAR USE,
BY T. LINDLEY KEMP, M.D.



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1853.

TO
SIR JAMES CLARK, BART., M.D.,

PHYSICIAN IN ORDINARY TO THE QUEEN,

This Guide

TO THE

PRESERVATION OF HEALTH AND THE KNOWLEDGE OF DISEASE,

Is, by kind Permission, Dedicated,

AS A MARK OF RESPECT,

BY HIS OBLIGED AND OBEDIENT SERVANT,

THE AUTHOR.

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These are intended to be supplementary to the body of the Work. In it the main aim has been to expound principles. In these, isolated facts are explained. It is hoped, too, that they will be found convenient for reference.

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A VERY EXTENDED GLOSSARY AND DICTIONARY OF MORE THAN TWO HUNDRED CLOSELY-PRINTED DOUBLE-COLUMNED PAGES.

INTRODUCTION.

WERE any hundred non-professional persons asked, in what the Science and Practice of Medicine consisted, we believe ninety-nine would reply, that it was in discovering the exact disease from which any sick person suffered, and in administering that particular remedy which experience had pointed out as suitable for such a malady; and yet, a moment's thought would convince any one that this is perfectly impossible;* for if medicine were made up of such disjointed facts, no one could remember a tithe of them. In fact, however, medicine never has, and never can, be practised satisfactorily in such a manner. At all times "medicine has been, and still is, with every person, founded more or less upon certain principles established by reason." In other words, there are certain great principles, by means of which the scientific practitioner is guided, not only in doubtful cases, but in the most common and distinct which he meets with.

It is true, there are a few diseases for which we know that there are specific remedies; that is, for each of them there exists a certain drug, which, if properly administered, generally puts a stop to their progress in the constitution. A well-known example is the ague, which is certainly cured by Jesuit's bark, or quinine. But this class of diseases is very small, and even they cannot be properly treated

* In Sauvages' 'Nosology,' now lying open before us, there are three hundred and fifteen diseases described, many of them with an immense number of subdivisions.

without a knowledge of general principles, not only in cases where the disease does not yield to the bark, but also in those, of frequent occurrence, which require additional treatment, differing in different individuals, and for which no empirical rule can be laid down, or, if laid down, can be reasonably supposed to be acted upon. Other diseases, for which no specific remedies are known, and which comprise almost all our maladies, must be treated entirely upon general principles.

To use the words of Bacon, "It is the office and excellence of all science, to shorten the turnings and windings of experience." An art founded upon a science is more or less perfect, just as the great general principles of the science are more or less exactly defined and correct. The art of the physician depends upon the science of medicine, and only differs from navigation founded upon astronomy, or certain manufactures founded on chemistry, in being less perfect and exact, because, from the greater difficulty of its objects, the science has not such correct general principles. Still, however, it has its general principles, and doubtful and imperfect as some of them may be, it is only by following the deductions to be drawn from them that the physician can hope to cut short disease, or relieve the physical sufferings which affect mortality.

Non-professional people have always shown a great and very natural desire to know something of medicine, and there have been a number of dictionaries of popular medicine, and the like, laid before them. These are, of course, of various degrees of merit, but all (at least all that have come under our notice) merely state a number of isolated medical facts, in non-medical terms. We therefore consider them as useless in giving instruction for the domestic treatment of disease, and what is of far more real consequence, likewise useless in affording to their readers information regarding the operations going on in health and disease in the human body.

Our intention, in the following pages, is to present to our readers, in ordinary language, an account of the great principles of

medicine. We purpose to state the manner in which the various functions of healthy life are performed, the best means of keeping them in that state of health, the various disordered or diseased functions, and the methods which we possess of modifying them—all of which are, by medical men, reduced to general laws or principles, obtained by reasoning upon a great number of separate facts.

With regard to the comparative usefulness of these two methods of treating popular medicine, we may give an illustration. A person may read in the common domestic manuals, that if an individual be wounded, say in the bend of the elbow, and if blood flow from the injured part, he must, if it come in jets, and be of a scarlet colour, apply a bandage between the elbow and the shoulder, and that, if he do so, the injured part will cease to bleed. But, on the other hand, if the blood come in one continuous stream, and be of a dark red colour, he must not tie a ligature between the elbow and the shoulder—this would make the blood gush out much faster and more dangerously—but he must apply the pressure between the elbow and the wrist. All this is perfectly true, but if any one who has read it in some domestic manual happens to be present when such an accident occurs, and where no surgeon can be had, he is as likely to forget himself as not, and to do precisely the wrong thing. If, however, on the contrary, the circulation of the blood in the human body were explained to him—if he were told that the heart was situated on the left side of the chest, where he could watch its heavings; that a large artery arising from one compartment of it was filled with fresh nourishing blood, bright, and of a scarlet colour (he would understand, also, why it was scarlet); that this artery sent off branches to all the remotest parts of the body; that the blood passed through these, being principally driven by each heave of the heart, and therefore in jerks; that this scarlet blood, having nourished all parts of the body, lost, from reasons which he would understand, its scarlet appearance, and became dark, and entered the veins to be carried back again to the heart, in which, being now

at a farther distance from the propelling power of that organ, its current was slower and steadier; and that on its arrival there another process was begun to purify it, and to add fresh constituents to it, so as again to render it nutrient;—were all this explained to him at length, and the various proofs laid before him, then, if ever he saw bright scarlet or arterial blood flowing from a wound, he would know that he ought to apply the pressure between the heart and the wound. He would also know how to act if the blood were venous. He would have acquired a principle applicable to all kinds of bleedings, and which, if for a moment forgotten, could easily, by a little thought and reflection, be brought to mind again. Or we may take another illustration, drawn from the application to medicine of a science of which almost every one now knows something—we mean chemistry. A great number of poisons have chemical antidotes, that is, substances which, by combining with the poison, even in the stomach, form a new compound substance, which is harmless. A person may read, for instance, that chalk is an antidote to oil of vitriol, white of egg to corrosive sublimate, oil to potashes, Glauber's salts to lead, &c.; but if he only knew these as separate facts, he would likely, in any sudden emergency, give the chalk for the corrosive sublimate, administer eggs to the man who had swallowed vitriol, and dose the one poisoned with lead with lamp-oil. Whereas, if he knew chemistry, he would be independent of such isolated facts—he would have some general principles to guide him, and could scarcely go wrong.

We do not think, however, that the popular study of medicine in any form is calculated to be of very much DIRECT practical utility. Such a knowledge of medicine as is necessary for a physician, even to render him competent to treat the slightest forms of disease, requires years of hard study and constant observation of diseased actions. Indirectly, indeed, a knowledge of the general principles of medicine, such as can be easily acquired by an amateur, may be of great use, inasmuch as it teaches the causes of disease, and the

means of avoiding them, and points out the rationale of the directions of the medical man, which from not being understood, are often fatally neglected. In a particular manner, it enables a non-professional man to distinguish between regular and irregular medicine, or quackery—between the scientific practitioner and the charlatan. Formerly this was more easily done than now by any one of ordinary intelligence; but in the present day, there are systems of quackery which profess to be based upon scientific theories, and which are headed by regularly educated medical men. Any person, however, with even a slight knowledge of medical science, can in a moment perceive the futility of these systems.

But it is not upon the score of usefulness that we invite non-professional people to study the elementary principles of medicine. It is because we conceive them to be worth the attention of any intelligent mind. We can imagine no physical science more so than one which teaches us, for instance, how we behold surrounding objects, how the light is by disease shut out from us, and how by art it is again restored; or, how the mind is mysteriously connected with the body, how its powers are obscured by disorders of the latter, and how we possess means which frequently restore them to their original state. Always keeping in view the inferiority of the study of any physical science to that of many others, still, we think, that of all the sciences purely physical, that of the principles of medicine yields to none, either in importance or in interest.

The “science of medicine,” or “the principles of medical science and practice,” may seem vague terms. The physician is very properly required to perfect himself in many sciences before he is permitted to practise his profession. Still, properly speaking, “medical science” contains only four subdivisions. The first teaches us the laws of life, and contains the history and explanation of all that takes place in the healthy body: this is termed Physiology. The second has for its object the laying down laws for the due preservance of the functions in a state of health: this is called

Hygiene. The next instructs us in the various phenomena which constitute disease or induce death, and embraces the history and explanation of all that takes place in the diseased body : this is named Pathology. The last is Therapeutics, and teaches the various means which we possess of modifying or putting away these diseased states.

These will form the topics of the following pages, in which we shall attempt to give an outline of the great leading principles of each of these divisions of medical science. We shall occasionally find it useful to touch on anatomy, chemistry, and comparative physiology. We divide the work into four parts : in the first, we shall treat of Physiology ; in the second, we shall include Pathology and Therapeutics ; in the third we shall give an outline of Hygiene, confining ourselves principally to dietetics, or an account of the various articles of food and drink, with their relative salubrity ; the fourth part will be devoted to the very important subject of Quackery.



I



II



III



IV



V



VI



VII



VIII



IX

THE MEDICAL GUIDE

TO THE

PRESERVATION OF HEALTH.

PART I.—PHYSIOLOGY.

CHAPTER I.

LIFE—ORGANIZATION—DIVISIONS OF THE ANIMAL KINGDOM.

CORRECTLY speaking, Physiology is the science which explains all that takes place in the living adult body while in a state of health, and also the manner in which the body gradually attains this state of perfection. We shall almost entirely confine ourselves to the first of these topics.

When we look upon the objects which compose the external world around us, we immediately observe that they are composed of two great classes, the one including those which have life, and the other those which have not. All animals and plants are found in the former class; stones, metals, gases, &c., in the latter. Upon examining more particularly, we notice that living beings are distinguished from the others by the possession of certain *organs*, which organs perform certain functions. A plant, for instance, by means of the organ which we call the root, absorbs food, which it converts into its own bark, wood, leaves, and so forth, and thus increases in size; and by other organs forms seeds, which, when covered with soil, become similar plants. By means of other organs, again, it performs other functions. In like manner, an animal, by one set of organs seizes its food, by another masticates and swallows it; from this food its digestive organs form and keep in integrity its various parts; by other organs it generates heat, and by others, again, performs other functions, all tending to keep it in life. But the stone does none of these things, and so far from having special organs, is one homogeneous mass. Hence we term the one class of objects the organic, and the other the inorganic kingdom. The structure of the simplest of these organs, even in very insignificant animals and plants, is often surprisingly complex. The hard central part of the eye of a

cod-fish, for example, which seems very simple, is actually composed of five millions of distinct fibres, which are fastened into each other by means of more than sixty-two thousand five hundred millions of teeth.

The physical structure of organized beings differs in a very curious manner from that of non-organized ones. Our readers are aware that chemistry has demonstrated that all matter (organic and inorganic) may be resolved into a few simple elements, which, by combining in various proportions, constitute the immense variety of objects around us. The elements forming living bodies are precisely the same as those of which the inorganic world is composed, yet the compounds thus formed, even in outward appearance, are very different in the two creations. The elements which, in inorganic matter, would form crystals, never do so in the living body; and notwithstanding we know the elements of which any living compound is composed, and the proportions in which they are combined, yet we cannot by any means artificially construct them. When life ceases, however, the same elements unite in crystallizable combinations. The elements which enter into the composition of living bodies, take, nevertheless, perfectly definite forms, which may be generally resolved into fibres, membranes, globules, and cells. In the interior of each organized structure, there are always cavities to be found, which, as well as the cells, invariably contain fluids, some portion of which, during life, is always in motion. Again, the symmetrical forms which organized bodies assume, differ from those objects of the inorganic world which crystallize, in never presenting plane surfaces and angles. They are also gradually developed, and the increase does not take place by simple additions to the outside, as is the case with a crystal, but by the thickening of the layers of a membrane originally homogeneous, and the gradual transformation of these into the various organs composing the body.

Besides the possession of organs, there are other important and general characteristics of the organic kingdom. Organized beings are constantly appropriating and assimilating to themselves surrounding matter, or, in other words, they have the power of nutrition, the result of this being to keep in a state of integrity those organs from which they derive their name. Then they always take their being from a previously existing structure of the same kind as themselves, and after a time, more or less prolonged, they end in *death*, this being not only a cessation of the various phenomena which they have exhibited, but an actual conversion of their elements into inorganic bodies. Thus a plant derives its origin from a seed which had previously existed as part of another plant; it assimilates substances around it, renders them suitable for its own nutrition, from these attains and keeps up its own organization, root, leaves, petals, stamens, and so on, and in the end—decays, ceases to show any of these phenomena, and its elements are resolved into an inorganic compound—soil. Our readers will observe, too, that its whole being is a constant change, from

the time the seed began to shoot, until the last leaf had turned into manure. This is the case with all organized beings.

These phenomena do not depend upon any chemical or mechanical properties of the organization; on the contrary, they are often inconsistent and opposed to them. Most modern physiologists, therefore, agree in regarding them as the effects of the vital principle, or of vitality. "These terms," says Professor Alison, "are the general expression for the changes occurring in living bodies, which we judge to be peculiar to them."

The great difference between the animal and vegetable kingdoms is, that the members of the former possess feeling or sensation, and that most of them have likewise the power of voluntary motion. A plant, like an animal, selects food from substances placed around it, and assimilates them to itself; it is affected by the atmosphere in a manner somewhat analogous to breathing or respiration in an animal; it has a nutrient fluid, which is conveyed through its textures like the circulation of the blood, and many other substances and secretions are formed from this blood. It has nutrition, circulation, respiration, and secretion. The animal has all these, but, in addition, it has consciousness of what is going on around it—it can touch, hear, and see,*—it can feel pleasure and suffer pain—it has the power of thought—and, as we just observed, it generally can of its own will change its position, so as to avoid pain, seek pleasure, or in any other way fulfil the higher destinies to which it is born. The highest animal, as man must be physiologically considered, shares with the lowest plant all those properties of operations of life to which we have above referred; and hence physiologists have made a great distinction between those acts which go on in the body independently of the will and mind, and which are termed organic actions, and those which are directed by the will and consciousness of the external world, and which are distinguished as animal functions. Some of the physiologists perhaps insisted too much upon this distinction, inasmuch as we shall afterwards see in man these very organic acts are often and materially affected by operations of the mind.

Excepting as regards these general truths, there is scarcely less difference between the animal and vegetable world, than between the various individual objects of which the former is composed. These have been most successfully arranged by Cuvier into four great divisions, of the general characteristics of which we shall give a rapid outline.

The Radiata is the lowest in the scale, and the least removed from a plant. The accompanying diagram (Plate I., fig. 1) of a star-fish (improperly so called, for it is not a fish at all), represents one of its members. Although widely differing in form, all the members of this division agree in one particular—their

* The external senses of some of the lower animals are very imperfect.

parts are disposed round a centre, with one or more rays, and from this they derive their name. All other animals have all the portions of the external form disposed symmetrically on each side of an axis, and not like these; circularly round a centre. At the end of each ray some suppose that there is an imperfectly developed eye. Besides the star-fish, we may give as examples of the Radiata, the sponges, the polypi, and the coralines.

The next division is that of the Mollusca. To it belong animals such as the nautilus, oyster, cockle, shipworm, &c. Their bodies are soft, and possess neither an internal skeleton nor (correctly speaking) an external one. Often, however, animals belonging to this division have the power of forming a shelly covering, which serves to protect them, but which, unlike a real skeleton, is of no assistance in locomotion. In their movements, they present a striking contrast to the division we are about to describe, being as remarkable for sluggishness as the following are for agility. They have large digestive organs, a heart for the circulation of the blood, a nervous system, and many of the senses.

The third division is that of the Articulata, of which familiar examples are to be found in the lobster, the spider, and all insects. Their name is derived from the fact, that their bodies are all composed of articulated rings. They possess all the senses, and a most complete set of organs for locomotion. Their limbs, when present, are numerous, sometimes very much so; but in other examples, as the leech or the worm, they are altogether wanting. Their skeleton is external, or on the outside. The skeleton, we should observe, is the term applied by anatomists to the fixed points upon which the muscles act.

These three divisions agree in being destitute of a backbone or spine. The possession of this bony column gives a name to the last and most important division—the Vertebrata, which includes birds, fishes, reptiles, quadrupeds, and man himself. This backbone consists of a number of separate pieces, joined together in such a manner as to produce great flexibility, each individual piece being named a vertebra. In man, the number of these is thirty-three; but in some of the lower animals they are much more numerous—some of the serpents, for example, having many hundreds. The tail of vertebrated animals is a continuation of the spine. In the Vertebrata, the skeleton is internal, and composed of bone. With regard to their external form, and to such internal parts as are connected with the functions of animal life, as the muscular apparatus, the organs of sense, and the nervous system, an exact symmetry is preserved, so that the two sides of the body are exactly alike, each part upon the one side having a correspondent part upon the other. All animals in this division have a brain, enclosed in a skull-cap. To the sides of the backbone are attached ribs, and the bones of the limbs; there are never more than four limbs. All have a mouth, with two jaws; and the organs for the senses of hearing, seeing, smell, and taste, are always situated in the head. They far excel the

animals of the other three divisions in intelligence. We must, perhaps, from this last assertion, exempt some of the insects, as the ant, bee, &c.

All these divisions are subarranged into classes, and the classes into orders. These orders, again, embrace a number of genera, and a genus often includes many species. Thus, the spaniel is the species, dog the genus, carnivora the order, mammalia the class, and vertebrata the division. We subjoin the two following little tables, referring our readers for further information to the various works upon natural history :—

* CLASSIFICATION OF THE ANIMAL KINGDOM.

DIVISION.	CLASSES.	NO. OF ORDERS.	EXAMPLES.
Vertebrata,	1. Mammalia,	8	Man, horse, whale.
	2. Aves,	6	Eagle, pigeon.
	3. Reptilia,	4	Tortoise, frog, newt, serpent.
	4. Pisces,	9 = 27	Salmon, perch, whiting.
Mollusca,	1. Cephalopoda,	1	Nautilus.
	2. Pteropoda,	1	Clio.
	3. Gasteropoda,	9	Snail.
	4. Acephala,	2	Oyster.
	5. Brachiopoda,	1	Lingula.
	6. Cirrhopoda,	1 = 15	Barnacle.
Articulata,	1. Annelida,	3	Leech.
	2. Crustacea,	7	Crab, shrimp.
	3. Arachnida,	2	Spider, tarantula.
	4. Insecta,	12 = 24	All the insects.
Radiata,	have five classes,	11	Star-fish.

ORDERS OF THE CLASS MAMMALIA.

Bimana,	Man.
Quadrumania,	Monkeys and apes.
Carnivora,	Hyena, bear, polecat, tiger.
Rodentia,	Beaver, rat, mouse.
Edentata,	Sloth, armadillo.
Pachydermata,	Elephant, pig, horse.
Ruminantia,	Cow, sheep, deer.
Cetacea,	Whale, dolphin.

CHAPTER II. *

GENERAL LAWS OF VITAL ACTION AND VITAL CONTRACTILITY.

BEFORE proceeding to examine in detail the phenomena of organic life, we think it will not be out of place to allude to some general facts found invariably wherever living structures are maintained, and which are conditions of vitality, the due observance of which appears to be imposed in all cases by the laws of nature.

We before remarked, that it was a regulation of nature that all living beings should spring from a previously existing living being. It further seems that the continuance of every existing animal is dependent upon a supply of previously organized matter, and that the material of the blood, or nourishing fluid, demands a constant supply of existing organized structure. Animals derive their support from feeding upon other animals and upon vegetables, while vegetables are, in a great measure, dependent upon the carbonic acid which, as we shall afterwards see, exhales from the lungs of animals. Thus all living creatures, from man down to the most insignificant piece of moss, are made to assist in supporting each other. This food, however, is not added to, or combined with, the structure of the animal who receives it, in the mechanical manner in which sugar mixes with water, or in the chemical mode in which soda, for instance, combines with oil of vitriol (forming Glauber's salts); but, on the contrary, the organized structure of the animal furnishes materials which combine with it, and assimilate it, and thus fit it for its nourishment. When this is done, the materials so combined becomes blood, which blood must move through the substance of every living animal. Again, another essential condition of vitality is, that this blood shall be frequently exposed to the air. The intention of this we shall afterwards find to be, that the blood may acquire oxygen, and part with carbonic acid gas.

Heat, too, is necessary to vital action, although an inordinate degree of it is destructive. The amount of it necessary to maintain life, varies very much in different objects of the animated creation. Animals can endure less cold than vegetables, warm-blooded animals less than cold-blooded ones, such as frogs and fishes; and those in a state of activity, as a dormouse in summer, less than when hybernating, as it does in winter. The presence of light, too, is necessary to the full development of all animals and plants.

* It is feared that this chapter will be found by readers, not familiar with physiology, somewhat abstruse. If this be the case, they are requested to return to it after having perused the next few chapters.

Again, this constant necessity for receiving food, even in the case of an adult, who does not increase in bulk, implies a constant waste. Every part of the body is always changing its old constituents, and receiving fresh constituents of a similar nature. Some parts of the human body change much more rapidly than others, and some parts, in fact, more at one time than another. The muscles, for example, when much exercised, part with their substance more rapidly than when in a state of repose, and, as we can easily imagine, at such times the individual or animal requires a larger supply of food. Then certain substances are excreted from the system of animals, and if by any chance they are retained, they act as poisons. Bile is an instance of this.

Now, when we see these general conditions of organic life, we perceive the necessity of organs in an animal body, each having its separate functions, and the whole combining to keep up the living condition of the body to which they belong. The necessity of receiving and assimilating previously organized matters, implies the existence of organs of digestion. The necessity of the blood being applied to all parts of the system, implies, also, the necessity of organs of circulation. If, as we see is the case, this blood must be brought into contact with the air, we need for that purpose organs of respiration. The formation of products to mix with the food, and of obnoxious matter, implies the necessity for organs of secretion and excretion. Without going farther, the vital importance of heat implies organs for generating the heat in the body. The business of the physiologist, in treating of organic life, is to describe these organs, and to state what is known of the change and operations which go on in them. This we now proceed to do.

Perhaps it may be necessary, in the first place, to consider if there are not some general vital properties which excite vital actions in all organs. Such general properties appear to exist, and there is perhaps little doubt but that the agency of the following must be admitted: Vital affinity, a power which throws the elements of the nutritious matter into the combination requisite for forming the various tissues and fluids, and which hinders any mechanical or chemical law from affecting them, and causing them to combine in such proportions as would putrefy and decay, as in fact these very bodies do, when, by death, this vital affinity is taken away from them. There is also, probably, some moving power of the nature of vital attraction and repulsion, which moves the fluids independently of any contraction of the solids; and, as we shall afterwards see, when we come to the animal functions, nervous agency exerts a great influence; but the power best understood, is that of contractility in the solids.

This power of contractility is principally to be observed in muscular parts, that is, in such parts as have a fibrous structure. A fibrous structure is composed of a number of little bundles, or fasciculi, fastened together by cellular membrane, each of these little bundles being, upon further examination, found

to consist of still more minute ones bound together in a similar manner. The primary or single filaments are extremely small; they appear under the microscope like a row of globules, and are maintained in their position by the power of vital affinity. In perfectly-formed muscular fibre, we see a remarkable set of striæ, or transverse bands; as, for example, in the flesh of animals. Contractility is not entirely confined to muscular parts. In the skin of man, which is not fibrous, contractions take place; as, for instance, after the sudden application of cold.

The most striking contractions which take place are preceded by the application of certain agents which we term stimuli. It is obvious that contraction must alternate with relaxation. When the contraction takes place, the fibres assume a zig-zag form, forming obtuse, and, in cases of strong contraction, acute angles, and become more rigid. Their strength of cohesion is increased, and they can support a heavier weight than in their ordinary or relaxed state. They swell out towards their centres, as any one can perceive by taking hold of his arm, and, by contracting the muscles, bring the hand to his mouth. The actual bulk is not, indeed, increased, but the relative position of the fibres to one another is merely altered. When the contracted muscle relaxes again, the fibres lose their zig-zag appearance, and become straight and parallel to each other.

The power or susceptibility of muscles to contract, is termed by physiologists, irritability. In the most distinctly contractile parts, as in the muscles of the limbs, the heart, the arteries, &c., we can notice very various degrees with regard to the facility with which the contractions are produced, as well as a great difference with regard to the strength with which they are performed, and the facility of exciting them. In the muscles of locomotion,* and in the heart, we see both the strongest contractions and the greatest power of repeating them. The latter organ contracts and relaxes seventy times in a minute, often much more frequently, upon the application of the stimulus of the blood, and with such a force as to exercise, at least, the principal effort in propelling the whole mass of blood through the body. We see in the arteries, and other parts of the body, contractions produced by the application of certain irritations which go on to a great degree, but which do not alternate with such rapid relaxations as we elsewhere notice. It has been proposed to restrict the term *irritability* to the first of these, and to give to the latter the name of simple *contractility*.

There is, moreover, in certain living solids, another contractile power, which is distinguished by its requiring no stimulus to excite it, and by its not alternating with relaxation, but, on the contrary, maintaining a degree of contraction which remains until after death. This is termed *tonicity*. Various examples

* When we treat of motion brought on by an act of the will, we shall have occasion to recur to contractility. At present, we beg to remind our readers, we are dealing only with *organic* function.

of it can be adduced. One is, the fact that a living muscle, if cut, retracts more than a dead one, and retracts permanently. When a limb is permanently bent, the muscles which were employed to flex or bend it become permanently retracted. If an animal be bled to death, the arteries gradually contract until their internal surfaces approach. All these effects seem to be owing to the exercise of this species of contractility. The stiffening of the body after death, which, as our readers are probably aware, merely lasts for a few hours, would appear to be the last exercise of this power of tonicity. It certainly is the result of no mechanical or chemical, but of a vital cause, inasmuch as it does not take place when death has occurred in any very violent and sudden manner, as in instances of sudden death from excessive mental emotion, or lightning, in which cases life has been violently and suddenly destroyed. It occurs in the ordinary cases where life slowly ebbs away, and long lingers around the body.

When we prick a muscle, or when the blood touches the heart, the stimulus which causes contraction is directly applied ; but contractions, even stronger than those produced in this manner, take place when the stimuli are applied to the nerves which enter these muscular structures. We shall hereafter have occasion to observe how voluntary acts and passions of the mind, by means of the nervous system, thus produce them. If we pinch, or otherwise irritate a nerve which enters any muscle, that muscle is thereby thrown into violent contractions, and still more so if we pass a stream of electricity through the nerve. Such contractions take place in the cold-blooded animals some hours after death, even when a very feeble electrical current is used, and it is to the accidental discovery of this that we owe the modern science of galvanism. Galvani, from whose name that of the science is derived, was a professor of medicine at Bologna, and his wife happening one day to place some skinned frogs which she was preparing for soup, near an electrical machine, was astonished, and probably frightened, to see, that when she touched them with a knife, (which had doubtless received a slight charge of electricity from the machine,) the deceased frogs went into strong convulsions. Farther experiments were made: it was soon found that the convulsions were stronger when two metals were used, and it was next discovered that the galvanic current was produced by the contact of the two metals—a discovery which, we need not say, has since proved of vast importance.*

Much discussion has taken place as to the connection between the nerves and these vital contractions. This is a question into which, in a popular and elementary treatise like the present, it is impossible to enter. The truth appears to be this, that the vital contractile power of muscular parts is inherent in themselves ; but that it is affected by changes which take place in the nerves, and that

* Various unpleasant experiments of this nature are said to have been made upon the bodies of recently hanged criminals.

it is excited in most muscles, and increased, altered, or diminished in other ones. In other words, the nervous system has, over the contractile power of muscular parts, an occasional controlling influence. Those causes which, acting through the nervous system, augment this power, are called stimulants, and those which produce the opposite debilitating effect are termed sedatives.

The contractile powers of muscular structures undergo various changes in the different stages of life. In youth, they are more easily excited, but less vigorous; in adult age, stronger, but less easy of agitation; and in old age, they experience both a diminution of strength, and of the facility of being excited.

CHAPTER III.

THE CIRCULATION OF THE BLOOD.

WE have already observed, that Nature requires the existence and motion of a nutrient fluid in every living animal, and also requires that it be exposed to the air, a necessity implying the existence of organs of circulation. Upon examination, we find such organs in every class of living beings.

Among the lower animals, these organs are indeed very simple. In the Polypi, and other zoophytes, one apparatus serves for both digestion and circulation. The food which they receive seems to require but little assimilation. The digestive cavity has small canals opening from it, along which, currents may be seen passing in different directions. These currents are their blood. In the Annelida, a somewhat more complex circulation is found. The annexed engraving (Plate I., fig. 2) illustrates that of the leech, a member of this class. B B, C C, are two main lateral vessels communicating at their extremities, and by transverse branches, with one another, and also with the central vessel, A A. Alternate motions of the blood take place in these vessels: at one time, the one, B B, and the central, A A, with their communicating branches, are seen filled with blood; while the vessel, C C, together with its communicating branches, is empty. The next moment, C C, and its branches are filled, while B B is empty; so that the central vessel with one lateral, is always opposed to the other lateral one. For about twenty pulsations of this kind, the central acts with one of the lateral, and then with the other. By these means the nourishing fluid permeates all parts of the body, and provision, to which we shall afterwards have occasion to allude, is made for exposing it to the air.

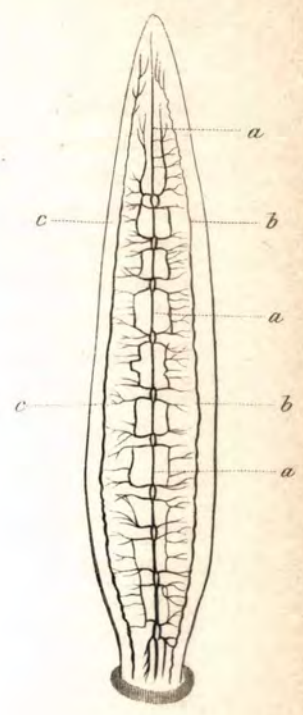
In the Insects, two sets of vessels are seen, which are somewhat analogous to the arteries and veins which we shall soon find in the higher animals. The

Fig. 1.



STARFISH. p. 11.

Fig. 2.



p. 18.

CIRCULATION OF A LEECH.

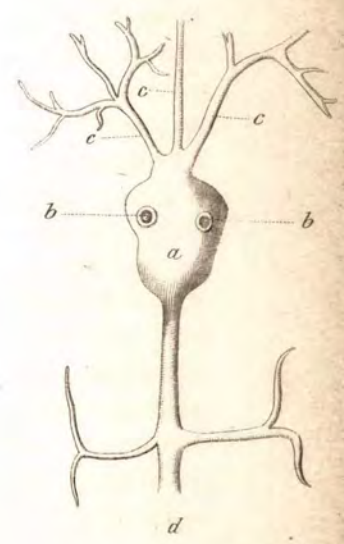
Fig. 3.



p. 14.

CIRCULATION OF THE INSECT.

Fig. 4.



p. 19.

CIRCULATION OF A LOBSTER.

accompanying figure (Plate I., fig. 3) illustrates the circulation in an insect. The large vessel, A A, is generally called the dorsal artery. It is divided by constrictions into numerous cavities, into which the blood flows, and from which it is prevented from regurgitating by means of valves. Through this artery the blood passes from behind forwards, and diverges into small streams, which distribute it to different parts of the body. The blood then returns and empties itself into the abdominal vessels, marked B B, which we may consider as corresponding to veins. These open into the dorsal artery, to which, through them, the blood returns.

In still higher animals, in addition to two sets of vessels, there is a heart, *i. e.* a hollow and strong muscle, whose contractions serve to propel the blood through the vessels. Simultaneous with this, we find a change in the mode of respiration, a point which we shall afterwards explain in detail. In the classes of animals whose circulation we have briefly pointed out, there exists no special arrangement of the vessels for the purpose of exposing the blood to the air; but in those which remain for us to notice, we shall always find an arrangement adapted to this particular purpose, which conveys the blood, exhausted of its oxygen, either to lungs or gills, there to come in contact with the atmosphere. The annexed sketch (Plate I., fig. 4) exhibits the circulating apparatus of a lobster. The heart is marked A, from which proceed large arteries, c c c and D. These subdividing, convey the blood to the different parts of the body, after which it runs into small veins, that empty themselves into larger ones, freely communicating with one another; other vessels take it from these to the gills, where it is acted upon by the air, and being rendered fit again for circulation, it returns to the heart by means of veins, which gradually terminate into the two trunks, B B. In other molluscous animals, the heart has two cavities, the blood from the gills being received into one of them, and by its contraction transmitted into the other. This arrangement we shall find in all the higher animals. The cavity which receives the blood from the lungs, or gills, is always termed an auricle; the other, which propels it into the arteries, is called a ventricle.

Among vertebrated animals, the circulation of the fish is the simplest. The figure (Plate II., fig. 5) illustrates it. The veins of the whole body centre in the veins, B B, which convey the blood to the auricle, A. From this the blood passes into the ventricle, C, and from that it is propelled into the main artery, D. This gives off the arteries, E E, which carry the blood to the gills, where it meets with the air. These all flow into the large artery, F, which, by its branches, distributes the blood to all parts of the body, and thus conveys nutrition. It is then taken up by veins, which terminate in those marked B B, from whence it is poured into the auricle, as we commenced by stating.

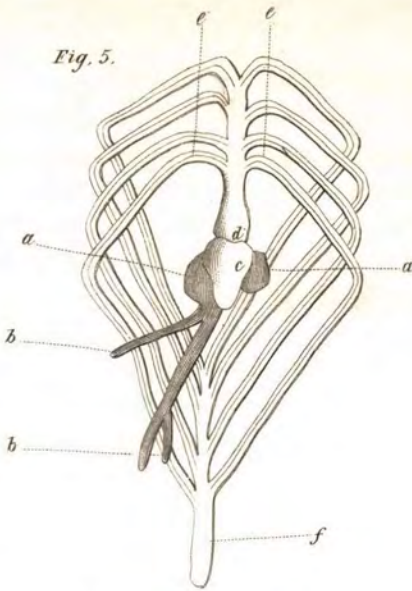
We regret that it would occupy too much space to describe the circulation in other animals, in some of which the process more closely resembles that which

exists in man. All classes, lower in the animal classification than birds and the mammalia, agree in this, that their temperature is much lower, and hence we term them cold-blooded, because their blood, and consequently all parts of their bodies, as we shall afterwards explain, is colder than that of either birds or beasts. In all these inferior classes, only a portion of the blood which is circulating in the system has been exposed to the air. In the higher animals, the whole of it is exposed, by means of what is called the double circulation—so termed, because there are two sets of circulating apparatus; one for conveying all the blood which has circulated through the body to the lungs to be aerated, and another for distributing the blood, the whole of which has been aerated, through the system. There are really two hearts, but as they are joined together they are usually considered as forming but one. This heart is divided into four cavities—two auricles, and two ventricles: one of the auricles being for the reception of the blood which has circulated in the body from the veins; the other for the reception of it when it has returned aerated from the lungs. One of the ventricles takes in the vitiated blood from the auricle into which the veins are emptied, in order that it may propel it to the lungs, and the other sends the blood which is poured into it by its auricle, and which has come from the lungs, to all parts of the body.

We now proceed to describe the circulation in man, the organs of circulation, the course the blood takes, the evidence of that course, and to consider what are the causes which promote its career through such an intricate labyrinth.

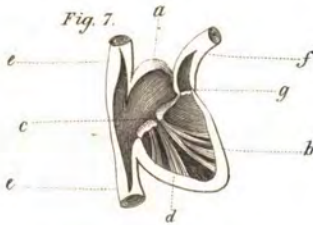
The human heart is situated upon the left side of the chest, its apex, or point, which is downwards, tilting against the sixth rib. It is placed between the two lungs. Its form is conical. From its base, which is placed superior, or nearer to the head, the great vessels which proceed from it arise. It is surrounded by a large bag, called the pericardium, or heart's purse. This is a closed double sack, and has been familiarly compared to a double nightcap. (See fig. 14, Plate V.) It is divided into four chambers, or cavities. This division is effected by means of a vertical partition, which divides the heart into two halves, that do not communicate with one another, and which resemble each other, with the exception, that the one to the left has thicker, and therefore stronger walls or sides. Each of these halves is again subdivided by a partition into two cavities, which respectively communicate with one another. Thus we have a right and left auricle, and a right and left ventricle, the right ventricle communicating with the right auricle, and the left ventricle with the left auricle, but having no further communication. The accompanying diagram (Plate II., fig. 6) shows both these and the large vessels which arise from the heart. Our readers will also see from it the course of the blood through the heart. 1 and 2 are two veins (*venæ cavæ*), into which all the other veins of the body converge; these enter the right auricle, 3, and empty their blood into it.

Fig. 5.



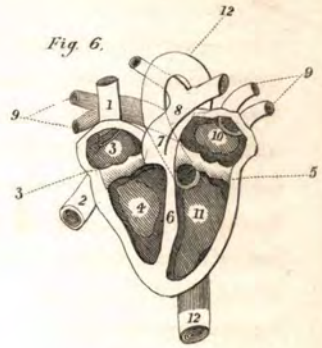
CIRCULATION OF A FISH

Fig. 7.



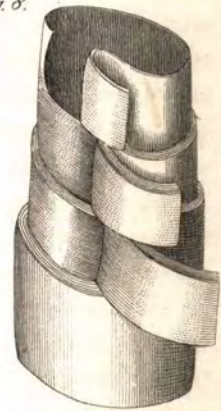
VALVES OF THE HEART

Fig. 6.



THE HEART OF MAN

Fig. 8.



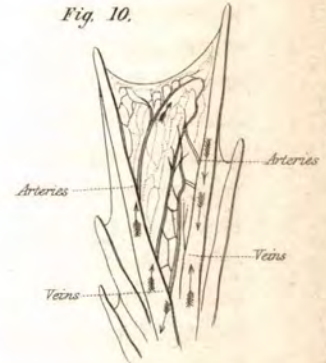
COATS OF THE ARTERIES

Fig. 9.



VALVES OF VEINS & SMALL VEINS

Fig. 10.



CIRCULATION IN THE WEB OF FOOT OF THE FROG

From this the blood passes into the right ventricle, 4, from whence it is driven into the large vessel, 7, (the pulmonary artery,) which is observed to divide into two branches at 8, and which leads to the lungs. From the lungs, the blood returns to the heart by the four pulmonary veins, 9, 9, 9, 9, which enter the left auricle, 10; from that it passes into the left ventricle, 11, and then to the great artery, 12, which, passing down behind the heart by its divisions and subdivisions, distributes blood to all parts of the body.

Our readers will perhaps wonder that the blood does not regurgitate, especially when they immediately learn that the cause of its onward motion in the heart is produced by the contractions of the auricles and ventricles. Why, it may be asked, when the right auricle, for instance, contracts, does not the blood flow as much backwards into the vena cava, as forwards into the ventricle? When the left ventricle contracts, how does it drive all the blood into the aorta, and not back again into the auricle? Similar questions may be put regarding the other two cavities. To prevent such disturbances to the circulation, a most beautiful mechanism is provided. The blood is prevented being driven back by means of valves, which guard the apertures by which it enters. These valves consist of membranous folds, so constructed, and so attached to the surrounding parts, that while they allow the blood to flow in the course which we have described it to follow through the heart, yet become so tightened and altered in position, as to close the aperture when any cause acts which would direct the current the contrary way. Fig. 7, Plate II., is a sketch of the one between the right auricle and ventricle. The auricle is represented by A, into which the two venæ cavæ, E E, enter, and which has to transmit its blood into the ventricle B, through the aperture C. This ventricle, again, transmits its contents to the lungs. At each side of the aperture, two membranous folds are seen, which are kept in their places by the tendinous cords, marked D. It will be perceived at a glance, that when blood is passing from A to B, these folds will be pushed forward by the stream, and will offer no opposition to its flow in the right direction; but when B is filled, and begins to contract, the blood pushed against the inner side of these folds makes them close against each other. The cords prevent them from going any farther, and thus they completely stop up the aperture, and no blood can flow back in the wrong direction. A similar arrangement is found upon the other, or left auriculo-ventricular orifice, the only difference being, that the one upon the right side has three pointed divisions to which the cords are attached, and is hence called the tricuspid valve, while the one upon the left has only two such divisions, and, from a fancied resemblance to the head-dress of a bishop, is termed the mitral valve. The pulmonary artery, and the aorta, are provided with very similar provisions, to prevent the regurgitation of the blood into the ventricles. In the figure, G represents that of the pulmonary artery. It consists of three little folds of membrane, which,

when meeting together, are somewhat more than sufficiently large to block up the passage. As long as the blood is forced into the artery, these folds are pressed flat against its sides; but the moment the artery is filled, and the dilatation of the ventricle gives the blood an opportunity of returning, the fluid presses against the upper part of the membrane, and, by driving its sides together, completely prevents the possibility of its non-return into the ventricle. This valve, and that of the aorta, are, from their half-moon shape, called the semilunar valves.

Having thus rapidly sketched the anatomy of the heart, we now come to that of the arteries. The term artery was originally applied to this class of vessels, because they were supposed to contain air, or vital spirits.* They are flexible and elastic tubes, and are really divisions and subdivisions of the aorta, which we have just seen taking its origin from the left ventricle. Each artery is composed of three coats, as seen in Plate II., fig. 8. The outer consists of dense cellular membrane, and is the toughest and most distensible: the middle one is fibrous, and is called the muscular; it is the most elastic, the thickest, and the strongest; and the inner coat, through which the blood flows, is very smooth and thin, and is termed the serous coat. All the arteries are, to a considerable degree, extensible, and all are very strong, the smaller even more so than the larger. The large ones, which arise from the aorta, divide and subdivide into an innumerable number of branches, so that there is no part of the body, however small, which has not one or more of these subdivisions supplied to it. When we say that all the arteries of the system arise from the aorta, we are not quite correct. There are two exceptions, which, in a general treatise like this, need not be particularized. The Frontispiece exhibits the course of the principal arterial trunks in man. They freely communicate, by means of anastomosing branches, with each other, and this is especially true of the smaller ones. The pulse is the name given to the flow of the blood in the arteries, and corresponds with each beat or impulse of the heart. By feeling it, we ascertain the state of the circulation, and frequently, in disease, obtain very important information from it. It is common to feel it at the wrist, as a large artery, the radial, is there very near the skin, and therefore easily felt at that place.

After the blood in the arteries has nourished the different parts of the body, it is returned by means of veins. These, at their first origin, minutely unite together to form larger ones, until they at length centre in the *venæ cavæ*. The veins are much more numerous than the arteries, and hence the blood flows through them much more feebly; indeed, in an equal stream, and not in jerks, as in the arteries, so that no pulse is to be felt. The veins consist of two coats: the external, like the corresponding one of the arteries, being composed of cel-

* From *αἰρ*, air, and *ὑγιαίνω*, to contain.

lular tissue, but thinner and less elastic, though more distensible and tougher. The inner coat corresponds to the serous one of the arteries. In the larger veins there is some trace of the muscular or middle coat. The veins are provided with valves calculated to prevent the flow of blood in a direction away from the heart. Fig. 9, Plate II., shows these valves, and also the manner in which the small vessels ramify together, so as to form a large trunk.

Between the termination of the smallest arteries and the commencement of the smallest veins, another set of vessels are found, which are termed capillary vessels. Their name is derived from the Latin word *capilla*, a hair, although they are much smaller than hairs. They are very numerous in every part of the body, so much so, that the finest needle cannot be pushed into any part of the skin or flesh, without wounding one of them, and causing blood to flow. Their smallness only allows one globule of blood to pass into them at a time. Some anatomists suppose that they have no coats at all, but that they are merely channels, or tracts, in the various textures.

Having thus rapidly described the organs of the circulation of the blood, the heart, the arteries, the veins, and the capillaries, we now proceed to state more minutely than we have hitherto done, the course of the blood through them.

We start at the capillaries which enter the veins. The blood which we find in these has served its purpose of nourishing the various textures of the body. Pushed onwards, principally from a pressure of fresh blood from behind, it passes into the smaller veins, and by the same pressure is propelled into the larger veins, whose valves prevent its regurgitation. All the veins terminate in the *venæ cavæ*, and through them the blood enters the right auricle of the heart. Entering and filling this cavity, it causes it to contract upon it: this contraction drives it into the right ventricle, its return being prevented by the tricuspid valve. We may observe, that the moment the auricle has contracted upon the blood, and driven it into the ventricle, it expands, and is again supplied with other blood from the *venæ cavæ*. When the right ventricle is filled, it contracts, and expels its contents into the pulmonary artery,* all regurgitation being prevented by the semilunar valve. Forced along this vessel, the blood enters the capillaries of the lungs, where it is exposed to the air. From this it is gathered by other capillary vessels, which terminate in the four pulmonary veins; these conduct it into the left auricle, and this contracting, propels it into the left ventricle, its return being prevented by the strong mitral valve. The left ventricle, by its contraction, forces it into the aorta. Here the semilunar valve prevents any regurgitation. Fresh supplies of fluid being constantly delivered out of the left side of the heart, the blood is driven through the whole arterial system into the arterial capillaries, where it performs its proper functions. It then enters the venous capillaries, at which we began to trace its course.

* The only artery in the body which contains the vitiated blood usually found in veins.

When we consider that this circulation of the blood is constantly going on in our own bodies, we are apt to form an inadequate idea of the wonderful and complicated nature of its course. During the whole period of a long life, night and day, without a moment's pause or cessation, do these contractions of the solids, and this propulsion of the fluids, continue. More than a hundred thousand times in a day is the process we have just described repeated; so many times in the space of twenty-four hours do the various cavities of the human heart contract—so many times do the arteries receive their fresh supply of nutrient fluid—so many times do the capillaries expose it to the various parts of the body for their nutrition—so many times do the veins convey back to the heart this now useless fluid, useless except for conveying away the noxious matter which must be got rid of—and so many times is it sent to the lungs, and brought back to the heart renovated with air, and fit for again traversing the whole human texture. It is calculated, that out of the left ventricle issue, in the twenty-four hours, no less than thirteen thousand pounds of blood. The force of this ventricle, exerted at each contraction, is supposed to equal more than fifty pounds; and the velocity of the blood leaving it has been put down at the rate of one hundred and fifty feet in a minute. In some of the larger animals, these proportions are greatly increased.

The right and left auricle, and the right and left ventricle, contract and expand simultaneously. We may remark, in passing, that not only do the cavities of the heart forcibly contract, but they also expand with considerable strength. This, of course, produces a vacuum. We may also here mention, that two distinct sounds may be heard over the region of the heart, either by the naked ear, or, still better, by the aid of a stethoscope. One of these is a dull and prolonged sound, and precedes and accompanies the impulse of the heart against the ribs, or, in other words, the contraction of the ventricles. The other is a sharper and shorter sound, and immediately succeeds the first. The dull and prolonged sound is caused by the contraction of the fibres of the ventricle, and the sharp one by the stroke of the wave of blood against the semilunar valves of the aorta and pulmonary artery. As these sounds are altered by disease, a knowledge of them is very important to the physician.

That the course of the blood is as we have described it, is very completely proven by various facts. In the first place, the *venæ cavæ* and ventricles, in wounded animals, have been observed to contract in the manner above stated. Then, in those animals which have a translucent texture, we can distinctly see the termination of the arteries running into the capillaries of the veins. Again, the structure of the valves, both of the heart and of the veins, would prevent the progress of the blood in any course different from that which we have described, while it is precisely adapted to facilitate its progress in this course. It is a curious fact, and one which has been frequently referred to by natural

theologians, that it was the observation of this fact with regard to the valves, which gave to the discoverer of the circulation his first suspicion of the true course of the blood. Besides, if we place a ligature which will completely close up the calibre of an artery or vein, we observe that the artery swells upon the side nearest to the heart, while the vein swells upon that farthest removed from the heart. In a common bleeding from the arm, a ligature is tied above the elbow, so as to compress the veins which are very near the skin, and thus hinder the return of blood from the forearm to the heart. By this means a quicker and larger supply is obtained from the orifice, inasmuch as the usual supply of blood is coming from the heart, and little returning. But if, as sometimes happens with inexperienced hands, the ligature be made too tight, so as to compress the artery, not a drop of blood can be obtained, except the small portion contained by the vessels below the ligature. If, however, the ligature be slackened, the blood will flow in a sufficient stream.

Notwithstanding that these proofs of the circulation of the blood are both decisive and apparently very obvious, yet physiologists did not perceive them, or understand the true course of the circulation, until a comparatively modern date. This doubtless arose from many causes. While the ancient physicians perhaps excelled those of the present day, in the minute attention which they paid to every diseased action that was going on in the patients who consulted them, they were less attentive to the actions of the healthy body. Besides, the practical study of anatomy was much less cultivated by them than it was afterwards. Moreover, from a cause which we shall afterwards see, the arteries after death are entirely empty; and hence our ancestors not unnaturally imagined that the use of these vessels was to convey air, or some imaginary vital spirits, to the heart, and that the veins alone contained the blood. Many attempts have been made to prove that Hippocrates, who is the earliest author upon medicine whose writings we possess, was acquainted with the true course of the circulation. Among the most learned of these is that of the celebrated Austrian physician, De Haen. But it is quite certain that these writers are mistaken, and even their learning and ingenuity have failed to convince any one of the truth of their opinions. It is probable that Hippocrates had doubts upon the subject, and some of his expressions regarding it are certainly very curious; but it was not until the beginning of the sixteenth century that an idea of the true course of the blood entered into the mind of Vesalius, and even he, although he doubted the truth of the theories previously held regarding it, and although he almost stumbled upon the truth, merely questioned the common opinion, but offered no complete theory in its place. To use his own terms, he had "no inclination at present to make an innovation in part, because he was far from clear upon the whole." A few years after the expression of these opinions by Vesalius, Servetus, whose theological name and unfortunate

death are better known than his physiological reputation, seems to have attained still clearer views upon the subject. But the full discovery of the circulation was reserved for our countryman, the great Harvey, who lived in the reign of Charles I., and it was, as we have just remarked, from observing the valves that the idea first occurred to him.

As to the powers which move the blood, there is no doubt that the most important is the heart. Its contractions not only propel the blood forwards, but its dilatation, by forming a vacuum, causes the flow of this fluid towards it, in the same manner as a common pump draws water from a well. At the same time, it cannot be doubted that its motion is promoted by other causes. The arteries possess vital properties which affect it. They contract upon each successive portion of blood which enters them, so much so, that if any one of them have two ligatures placed upon it, and be punctured in the isolated enclosure between them, every drop of blood is forced out. The same tendency to contract renders them empty after death. But it is obvious that both this and their tortuous course, are circumstances so far from promoting, actually present obstacles to the free course of the blood. And yet many facts prove, that in them and in the capillaries its flow is promoted by other causes than the propulsive force of the heart. For instance, a considerable amount of force, indeed a larger force than the heart possesses, is required to inject and propel fluids through the blood vessels of a dead body. In proof of the same fact, it may be stated, that a very small amount of force—as, for instance, the simple pressure of the finger applied to an artery—is sufficient to arrest the flow of the blood within it, or, in other words, to counteract the propulsive efforts of the heart in that artery. Our argument, therefore, stands thus—if great force be required to propel the blood through the circulation, and if the force of the heart be small, some other propulsive power, in addition to that of the heart, must be in operation. It may also be observed, as corroborative of the same truth, that in diseased states—as, for instance, in palsy—which do not affect the strength and action of the heart, the circulation is much diminished in the palsied or otherwise diseased part. This shows that there exists in the system some motive power impelling the blood, which, in such cases, is suspended or weakened, and that this power is not the heart. Other reasons might be advanced to show, that there are powers impelling the circulation, which operate, not in the heart, but at a distance from it; and various opinions have been held regarding the nature of these powers. The most satisfactory theory is that which presumes the existence of a power of vital attraction between the particles of the blood and the various tissues of the body; but into such an abstract subject, it would be inconsistent with the plan and object of this treatise to enter farther.

CHAPTER IV.

THE BLOOD, ITS NATURE AND PROPERTIES.

THE blood is the name given to that nutritious fluid, the circulation of which we have been describing. We are accustomed to associate the idea of redness with it, but this red colour is only found in the blood of the higher animals. In perfect insects it is a transparent fluid, although, in the caterpillar, *i.e.*, the larva of butterflies and moths, it has a green hue. That of the worms has a reddish appearance, but in almost all the invertebrate animals it is colourless. Even in some of the vertebratæ, the whole of it is not always coloured. In the fishes, for example, it is transparent in the bulk of the body, and is only red in the heart, gills, and liver. Even in man it is not correct to call the blood red. That circulating in the veins and right side of the heart is only so, while that in the left side of the heart, and in the arteries, is of a scarlet colour.

The blood in the living human body, or immediately upon its emission from the vessels, consists of a clear fluid, in which a number of red particles are suspended. Its temperature is 100°, and its specific gravity 1050. To the fluid, the name of *liquor sanguinis* (fluid of the blood) is given; while the red particles are called globules. Shortly after being taken from the system, it coagulates, or divides into a yellow fluid, called serum, and a dark heavy mass, called crassamentum. This crassamentum consists of two parts, into which it sometimes spontaneously divides, as in cases of inflammation. When it does so, the colouring matter or globules are seen lying lowest, and the fibrine, a white tenacious substance, appearing on the top.

Of these three substances of which the blood is composed, the serum, the globules, and the fibrine, the serum and fibrine are combined in the clear fluid, and the coagulation depends upon their separation, and the fibrine taking the solid form and becoming attached to the red globules.

The serum has a specific gravity of about 1030, and when heated up to 160° of Fahrenheit, a coagulation is formed, consisting of albumen, a substance similar to the white of an egg. The fluid which still remains after this coagulation is called the serosity. It consists of water, an uncoagulable animal substance, and small quantities of the carbonate and the muriate of soda, the sulphate and the muriate of potash, and the phosphates of lime, magnesia, and iron. Besides these, there is a fixed oil, and probably other substances.

The fibrine has a peculiar tendency to assume the fibrous form. In its

chemical constitution it differs little from albumen, both containing carbon, hydrogen, nitrogen, and oxygen; but the fibrine has more nitrogen and less oxygen.

Two gases are also found in the blood, carbonic acid gas, and free oxygen.

The colouring matter cannot, unless fibrine be present, assume the solid form. It constitutes, however, the greatest and densest part of the crassamentum, its quantity being ten times greater than that of the fibrine. The average proportion of solid matter of the serum and crassamentum, and of water, in the human blood, is as follows, in a thousand parts:—

Water.	Solids of crassamentum.	Solids of serum.	
784	129	87	= 1000.

These proportions are somewhat different in the different sexes, and also in different individuals. The solids of the crassamentum are greater in persons of sanguineous and plethoric dispositions, than in individuals of weakly and phlegmatic ones, and are also greater in males than females. They are also altered by disease, particularly acute inflammation. The quantity of fibrine in blood is also variable, but its average is about five parts in a thousand.

The globules of the blood contain the colouring matter. They have a determinate shape, being, in man and almost all the mammalia, circular and flattened, while in the other vertebratæ they are oval. Their size is various. In man they range from the $\frac{3}{1000}$ th to the $\frac{4}{1000}$ th of an inch. While in motion in the living body, they never coalesce. If by accident at rest in the body, they tend to arrange themselves in determinate forms, a property, however, which they entirely lose when removed from the system.

As physiologists have detected in the blood so many of the constituents of animal principles which exist in the body, not a few of them are inclined to believe that all the solids and fluids of the system exist in the blood, and are merely separated from it, in the various organs where these animal principles are first known to appear.

The coagulation of the blood is a very interesting phenomenon; it consists in the separation of it, when taken out of the body, into serum and crassamentum. Were it not for this provision of nature, man would be liable to die from loss of blood after the slightest wound; but by virtue of this arrangement, when any small vessel is wounded, the blood coagulates at its orifice, and by its solidity prevents more from flowing. If a large artery, indeed, be wounded, the case is different; the strong impulse of the heart forces away the coagulated blood, and unless the injured vessel be compressed between the wounded orifice and the heart, so much blood is poured out, that, from a reason which we shall afterwards see when speaking of the causes of death, the wounded individual dies. As for the cause of the blood coagulating when removed from the body, we are now in a position to say that it does not depend upon any mechanical or chemical law,

and that its fluidity in the body is dependent upon its vitality. But the separation of the fibrine does not seem to be dependent upon the mere loss of life in the blood, it would rather appear to be, on the contrary, a vital process itself, and the last which takes place in the nourishing fluid. If, by agitation for some hours after its withdrawal from the body, the coagulation be prevented, its power of coagulating is lost; in other words, its death has taken place. It is not, perhaps, to refine more than we are warranted to do, if we conclude, that the attraction between the particles of the fibrine is opposed during life by a principle of repulsion, which is destroyed either by the death of the whole body, or by the death of that portion of the blood which is drawn from the body, and so separated from its vital affinities. These powers of attraction and repulsion between the various particles of the blood, seem to correspond with the irritability and tonicity of muscles. In cases of sudden and violent death, where life is immediately extinguished, as in death produced by a flash of lightning, and where, as we before remarked, we do not observe the stiffening or tonicity of the muscles, so also we do not find any coagulation of the blood.

The differences between arterial and venous blood are soon stated: the arterial contains more oxygen, and less carbonic acid gas. The reason of this we shall see in the chapter upon RESPIRATION. The arterial is also much brighter, and of a scarlet colour: it coagulates more quickly and firmly, or, in other words, seems to be endowed with a stronger vitality. The fibrine and solids of the crassamentum are proportionally larger in the arterial blood, and indeed it contains every element or substance of which the solids and fluids of the body consist. It therefore appears, that the oxygen, fibrine, and solids of the crassamentum are expended in the circulation of the blood from the left side of the heart to the veins.

CHAPTER V.

NUTRITION AND SECRETION.

IN all animals, the circulating system is the agent made use of for the purpose of nutrition, and it is in a great degree for this purpose that the blood is made to permeate through the system. That portions of the blood are continually being applied to the formation and support of the different solids and fluids, is abundantly proved by many facts. Thus the formation of the different parts is always going on—a fact which is evident to every one in the growing youth. And in the grown adult, we shall see there is a continual absorption of all parts of the system without any corresponding diminution of bulk, and therefore

there must be a continual deposition or nutrition going on in the adult system also. Besides, supplies are daily added to the blood, as we shall more fully understand when we come to speak of digestion; nay, if these supplies be but for a short space withheld from any one, he dies, and yet the blood does not increase in quantity, so that there must be a constant abstraction from it. We have also seen that the blood is supplied to the different tissues of the body by means of the capillary vessels, which readily admit of transudation; and that, moreover, in these vessels a very material change takes place in the blood, which, in addition, is, by its constitution, fitted to supply and keep up, in a state of integrity, every part of the body. In the case of a wound, we actually behold the blood turning into living solids, and filling up the gap between the cut edges. Whenever any part becomes larger than it was before, upon examination we find that the blood vessels leading to it are also larger, clearly implying the connection between a great degree of nutrition and a large supply of blood. In youth and in health, when a high degree of nutrition is going on, how vascular and florid is the appearance, compared with that witnessed in age or sickness! Other facts might be brought forward, but these which we have adduced are sufficient to prove the existence of the power of nutrition, and of its connection with the circulation.

The term Nutrition is used when we speak of the deposition of solid matter from the blood, and the term Secretion when we speak of the formation of fluids. There are, besides, two forms of secretion—secretion proper, when the fluid is prepared in a gland or organ for the purpose, and carried from it by its proper vessel or duct, as it is called; and exhalation, when the fluid is thrown out upon an extended surface. Thus the saliva is prepared by three glands situated in the mouth; the bile by the liver; while the perspiration extends over the entire surface of the skin. To the two former of these, then, we apply the expression secretion—the secretion of the saliva and the secretion of the bile, while we say the exhalation of the perspiration.

The course which those portions of the blood that nourish the body take, is not exactly known. Formerly it was thought that the arteries terminated with a visible outlet upon the nourished part, the exhalant surface, or the secreting organ. But this is doubtless incorrect. All that can be stated with certainty is, that after leaving the arteries the blood passes into the capillaries, and from these into the veins; and that the nutrition or secretion takes place in the capillaries. Probably the portions separated from the blood exude through the pores.

It may be doubted whether the different textures and secretions are formed from the blood at the parts where they appear, or whether they exist previously in that fluid, and are merely separated from it at these parts. Many circumstances have made physiologists incline to support the latter of these two opinions, and they urge many plausible reasons. It is certain that the blood

contains in itself, ready formed, by far the greater part of the substances found in the different textures, and probably all of them. In many cases of disease, textures and secretions are also deposited by the blood in different situations from their usual ones. Thus, bone is occasionally deposited in parts of the body where it does not commonly occur, many parts of the body besides the breast have secreted milk, and other examples have been recorded, all of which tend to support the opinion that the blood contains the substances, textures, and secretions of the body ready formed.

Some, in endeavouring to account for so many different textures and secretions being formed out of the same fluid, have supposed that the various degrees of length and contortion of the vessels through which the blood passes, act upon it in a mechanical manner, and, by variously affecting the distance and position of the various particles, produce the various products. But this hypothesis is undoubtedly without foundation, for substances the most widely different are formed in similarly arranged vessels, and those the most analogous are secreted by vessels the most unlike. Indeed, it would rather seem that the arrangement of the blood vessels depended upon the nature of the texture, and not the nature of the texture upon the arrangement of the blood vessels.

Causes acting upon the nervous system, as we shall have occasion to observe by-and-by, exert considerable influence upon the secretions, and hence some physiologists have supposed that nutrition and secretion are necessarily dependent upon some power or influence derived from the brain and spinal marrow, through the intervention of the nerves. This is, however, an erroneous idea. Secretion goes on before any nervous system is formed (we speak, of course, of the young of animals); it exists in monsters without a nervous system at all; in the lowest animals where none has been discovered, and in plants where none certainly exists. In many experiments, the nerve supplying an organ has been cut across, and the secretion has been modified, yet it has never been arrested, except in cases which can be otherwise explained, and sometimes it has not been affected at all.

Indeed there does not appear to be any other function of the living body, or any chemical or mechanical law, which can account for the phenomena of secretion, nutrition, and exhalation. But they certainly go on in accordance with some fixed laws. The only resource left is to refer them to some vital property, which, in the living body, modifies chemical affinity and suspends mechanical laws, and which varies in each different texture and organ, and causes them to produce different effects, and procure different results from the blood.

CHAPTER VI.

ABSORPTION.

THAT a continual absorption of the solids and fluids of the body is going on is very evident. We see the blood of the adult receiving an equal amount of supplies from without, as goes to that of the growing youth, and yet remain stationary in bulk. Parts of the body frequently waste, and sometimes the whole of it falls off, in consequence of fasting and disease. Whenever the nutrition does not go properly on, as in the case of palsy in a limb, or consumption in the system, we have emaciation. All these facts prove the existence of this power of absorption. Indeed, the very preservation of a texture from putrefaction seems to depend upon a perpetual change in its particles.

The instruments of absorption are the veins, and to a greater extent a peculiar system of vessels called absorbents. These latter extend over all parts of the body, except in the nervous system, and are divided into two classes, the lacteals and the lymphatics. The former take their origin from the stomach and bowels, the latter from all parts of the body. The lymphatics pass through oval-shaped bodies called glands, which are gathered in clusters in various parts of the body, as in the neck, armpits, &c. Like the veins, the smaller absorbent vessels unite, so as to form larger ones, and at length terminate in two trunks, which empty their contents into the large veins near the heart. Thus all the matters absorbed are poured into the circulation. The absorbent vessels are furnished with valves, which prevent the flow of their contents in a contrary direction to that which leads to their natural termination. At the same time their flow in this direction is not to be explained by any contraction of the solids, like that of the heart, but seems to be a strong instance of the efficacy of that power to which we give the name of vital attraction and repulsion.

We shall speak of the nature of the fluids which the lacteals contain under the head of DIGESTION. We may here observe, that these fluids are the nutrient portion which has been obtained from the food, and prepared by the digestive organs in such a manner as to supply the constant waste which the blood undergoes in nourishing the different textures. The contents of the lymphatics are the debris, if we may so call it, of the system, and are those parts of the body which can no longer remain in a vitalized state.

Very often, when any ulceration is going on upon a surface, the glands, through which those lymphatics which come from the ulcerating surface pass,

become inflamed, or, in other words, the absorbed noxious matter affects these glands. This is a circumstance of great importance in pathology, as for instance in cancer, where the disease often spreads to parts at some distance, having been carried thither by the lymphatics; and hence, after a certain time has elapsed, the cancer cannot be extirpated by cutting, inasmuch as the adjacent parts are sure to have become affected by the disease. But if the diseased structure be removed at an early period, before the peculiar matter of cancer has been absorbed, excision offers a very probable cure.

It would be out of place here to enumerate the various proofs that the veins perform the function of absorption. It is quite certain that they do so, although they have only been recognised in this capacity by the more modern school of physiologists.

There is a great difference in the different textures with regard to the rapidity with which this function of absorption goes on. Fat is very readily absorbed, as we see instanced in cases of fasting. We have a striking example of this in the hibernating animals, which, when they settle themselves for their winter sleep, are uncommonly plump, but, upon their awakening in spring, are exceedingly lean. The skin, on the other hand, is a texture in which this process goes on much more slowly. Scars and tattooing often last for life, and the blue colour brought on by the internal use of lunar caustic is generally permanent. These facts prove that the renewal of the particles of the skin is a very slow process, much slower than that which we see in most solids, and still more so than the very rapid absorption of food by the lacteals of the stomach and bowels.

CHAPTER VII.

THE PROPERTIES OF THE TEXTURES AND SECRETIONS, AND THE ANATOMY OF MAN.

WE have now made some advance in our inquiry into physiology; we have seen the distinction between living and inorganic matter, and the principal characteristics of the former, and we have pointed out some general vital laws and powers. We have seen how the blood is made to circulate through the system, in order to supply the waste which is constantly going on; we have considered the constitution and properties of this fluid; we have seen the manner in which it is applied to the frame for its nutrition, &c., and we have also considered the

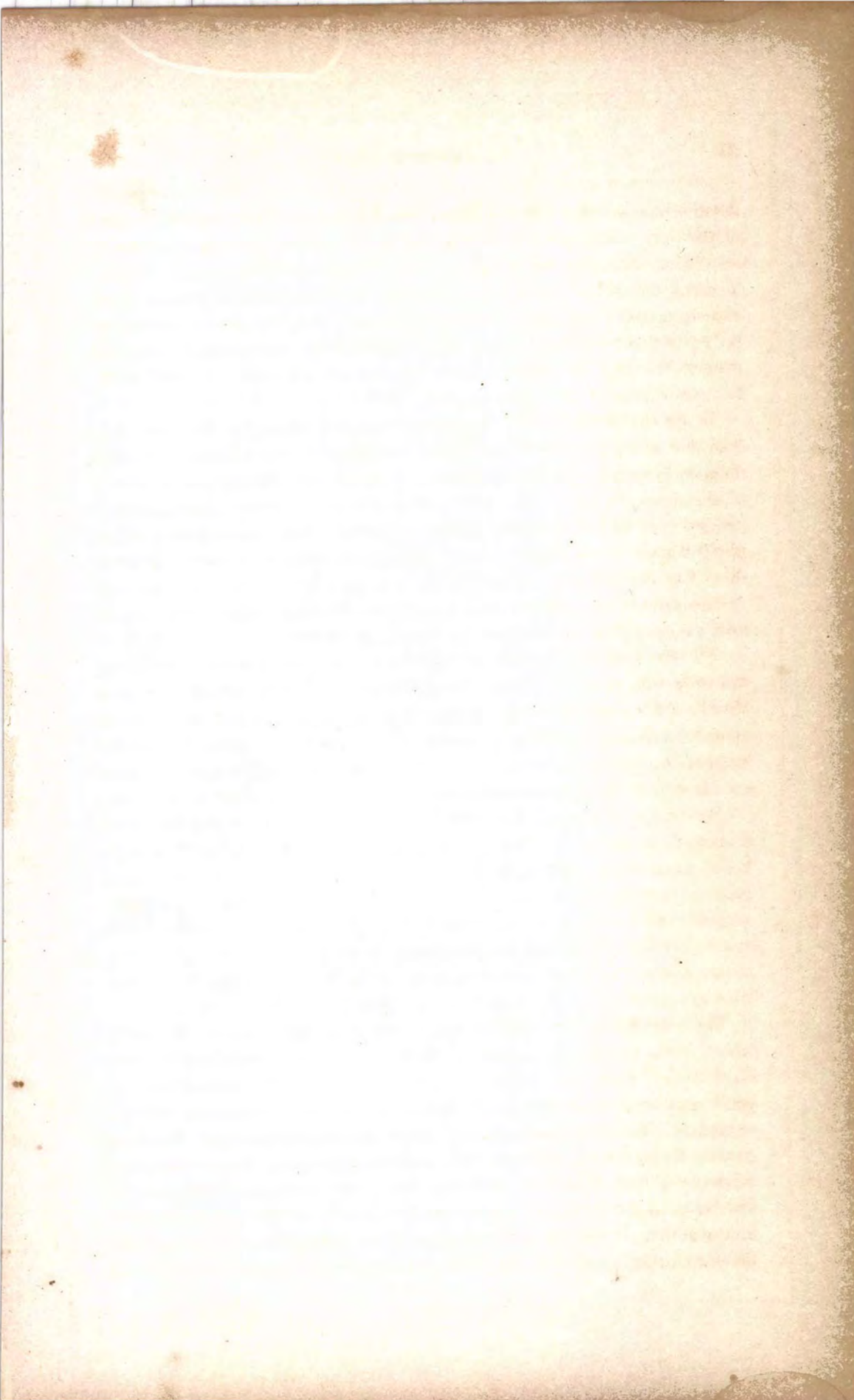
function of absorption. In a word, we have glanced at all the organic functions of the body. We have now to consider those in which sensation is concerned, respiration, digestion, the senses, locomotion, &c. Before proceeding to these, however, this would appear to be the proper place to give some account of the various textures and secretions which constitute the substance of the human body; to point out their leading properties, and also to explain, in a general manner, the physical relations which they bear to each other; in other words, to describe generally the anatomy of the human body.

By far the greater part of the body is composed of oxygen, hydrogen, carbon, and nitrogen. These are, indeed, combined in the different textures in different proportions; and if the reader be at all acquainted with the science of chemistry, he will not be surprised that a little difference in the relative proportion of these elementary substances, produces so great a difference in the physical appearances and properties of the compounds which they form. Besides these four, the following elementary substances enter into the composition of various parts of the body, but generally in very small quantities—soda, potash, iron, sulphur, phosphorus, magnesia, lime, and chlorine.

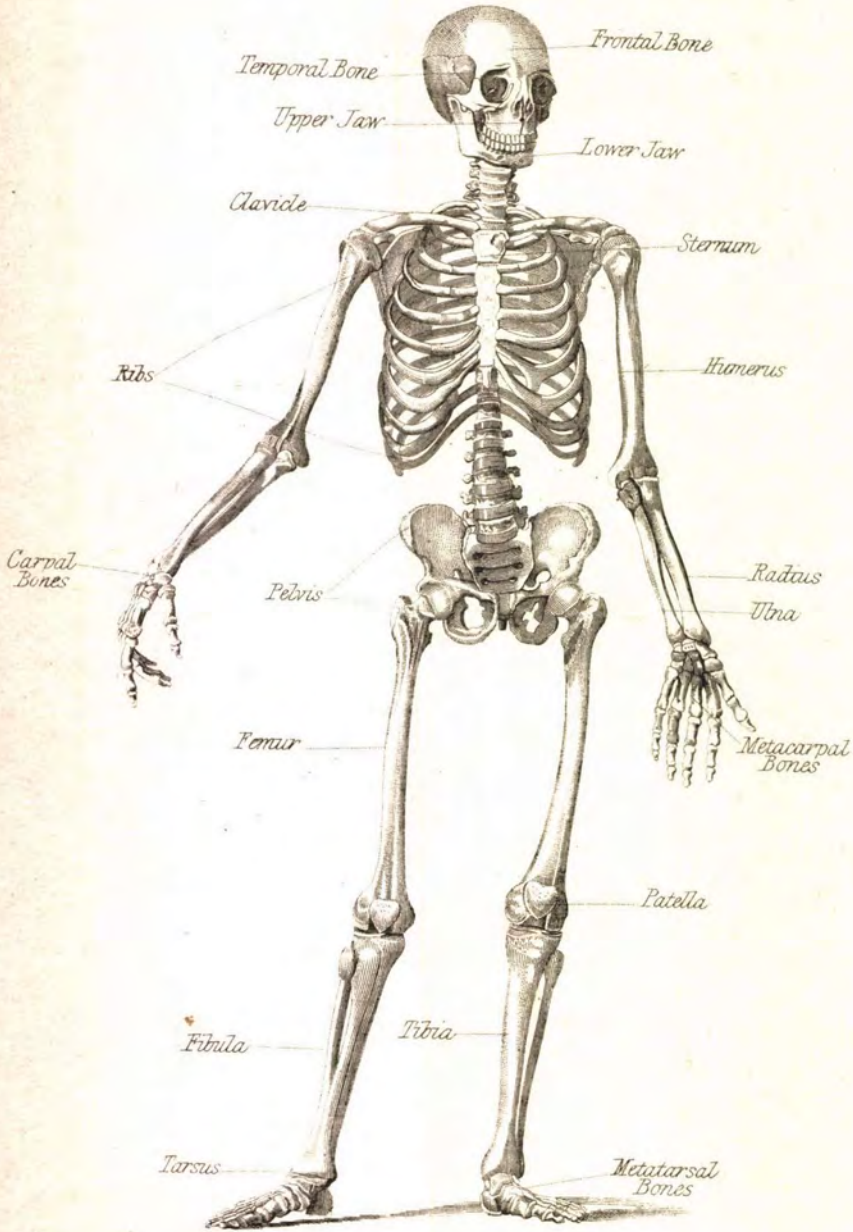
We have before stated, that all these substances are contained in the blood, and from the blood the tissues acquire them. We shall hereafter see that the blood keeps up its supply of them from the digested food. Hence every animal requires to eat for its nourishment such articles of food as contain the elements composing these substances. But this is not the proper place to enlarge on this subject; we therefore proceed at once to the description of the textures.

Bone is the hardest and densest of all animal substances. It forms the solid framework of the body. This framework is made up of a number of separate bones, to the aggregation of which the name of skeleton is given. The bones give the general form to the whole body, and the necessary strength and support to the various parts of it. They protect the more important viscera from external violence; they furnish attachments for the muscles, tendons, and ligaments; and the various modes in which the different bones are joined, or articulated to each other, are, as we shall see, essential to muscular action.

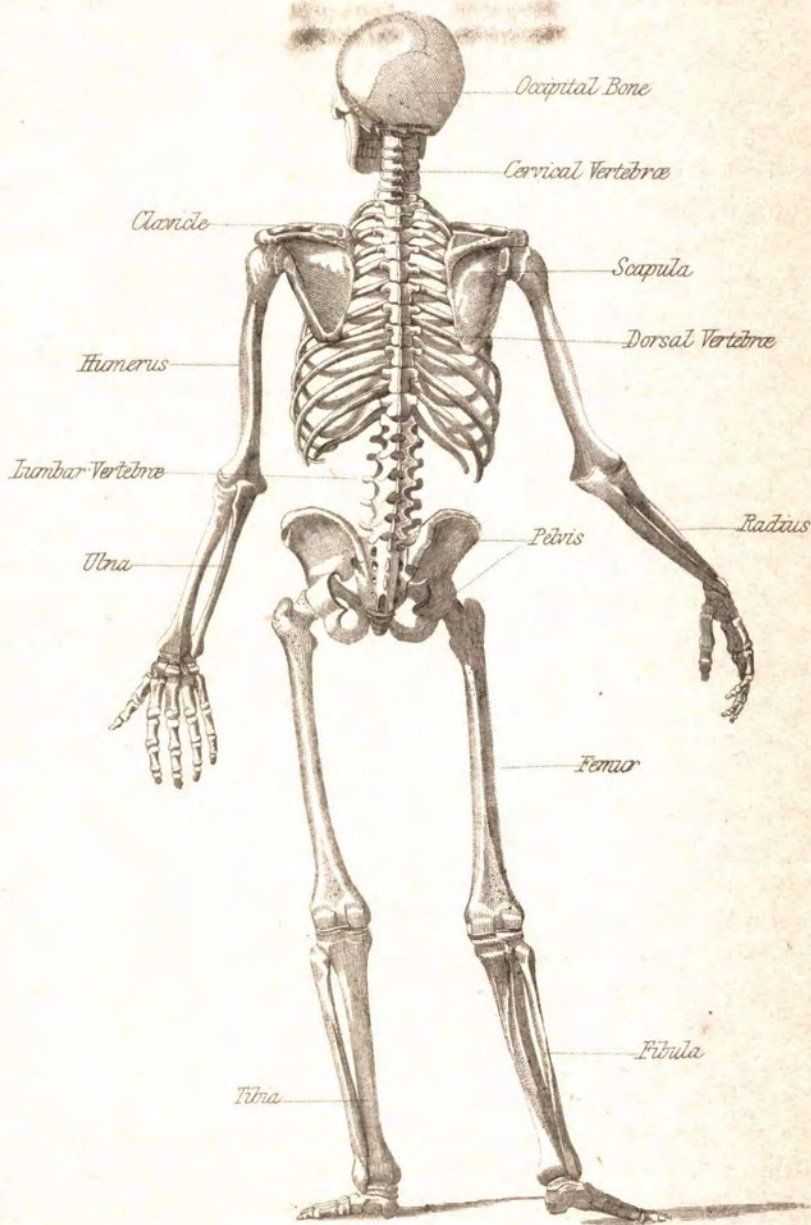
The bones are composed of laminæ, or layers, so arranged as to form cells, which, in the long bones, as those of the leg or arm, have the form of longitudinal canals. Every bone is surrounded by an investing membrane, termed the periosteum, and another membrane lines the interior, and contains the medulla, or marrow. Bone contains earthy and animal matter most intimately combined, even in the minutest particle. The earthy matter forms about a half, and consists of phosphate of lime, carbonate of lime, and phosphate of magnesia, the first being in the largest proportion, and the last in a comparatively insignificant quantity. These are readily freed from the animal matter by burning, and the combustion, while it destroys the latter, leaves the earthy unaltered. A



HUMAN SKELETON



HUMAN SKELETON



bone so burned presents the same external appearance as before, but is much more brittle. In old age, the bones have not their proper quantity of animal matter, and hence are more easily broken. The animal matter of bone is albumen in a solid form, and gelatine. By boiling bones in water, the gelatine is easily abstracted, and on cooling congeals into jelly. If this process is conducted under pressure, a still larger amount of it is procured, and the knowledge of this fact has been of use in economic soup-making. Gelatine (which is found in other substances of the body) is not only distinguished from other animal compounds by its solubility in boiling water, but by its forming a solid tremulous mass (jelly) when cooled. It is composed of carbon, hydrogen, oxygen, and nitrogen, with more carbon, and less oxygen, than most animal principles. It is also more putrescible.

When a bone is fractured by an injury, the neighbouring vessels secrete around the broken ends new osseous matter which unites them. This is called the callus, and is completed in a very few weeks. We may also here observe, that if anything press in an unnatural manner upon a bone, the part which is pressed upon becomes absorbed, soon disappears, and allows the substance which pressed upon it to take its place. It may seem astonishing that a hard substance like bone should yield to the pressure of substances far softer, but such is the case. This curious result is strikingly shown in many cases of disease, particularly where tumours press upon bone.

These facts abundantly prove that the vital processes of nutrition and absorption go on in the bones. Without the help of the former, the broken bone could not be healed, and, in fact, in old and debilitated persons, where the function of nutrition is almost at an end, fractured bones will not unite. Again, unless the power of absorption were in activity in the structure of the bones, its substance would not disappear from the pressure of a tumour. But still there is no doubt that, in ordinary circumstances, the tissue of the bones is not so frequently absorbed, and resupplied by nutrition, as that of most other parts of the body; and this is particularly true in advanced life.

We ought to mention, that, by immersing a bone in strong acid, all its earthy particles are dissolved, and nothing but the animal substances left. When this is done, the bone retains its original form, but becomes quite soft and flexible, and can, like a rope, be tied into a knot.

The number of the bones which constitute the human skeleton is one hundred and ninety-seven, not including the teeth. Anatomists divide them into three classes—that of long bones, where the length far exceeds the breadth—that of short bones, where the reverse is the case—and that of flat, or broad bones. These last always present a concave and convex surface, and are by their shape fitted for enclosing cavities. The femur, or thigh bone, is an example of the long class; the various bones of the wrist, or the scapula, are

examples of the short ones, and the ribs afford instances of those termed flat bones.

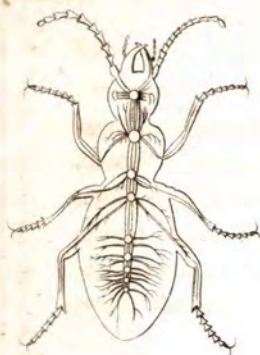
The marrow which all the bones contain in their cavities differs in nothing from common animal oil. It has no connection with the joints, and its use is not understood. There is a popular opinion that it is very sensitive, and that, in amputations, the most painful part consists in cutting through it. This is perfectly erroneous; the marrow has no sensation at all, and is merely an animal oil contained in the living body, but not itself alive, and, of course, possessing no vital properties.

The teeth contain more earthy matter than the bones, and as they are not naturally repaired after an injury (and for other reasons) they are not considered vital. The pain in toothache does not depend upon anything going on in the tooth, but in the nerve, which is situated at the root of it. We shall have occasion, in the chapter on DIGESTION, to allude to the different descriptions of teeth.

We may here shortly describe cartilage, or *gristle*, as it is popularly called. It is found in those parts of the body where it is necessary that strength should be combined with elasticity of structure. Hence it is present at the joints of the various bones; in the windpipe; the nose; and the external ear. Its chemical constitution very nearly resembles that of the animal part of bones. Indeed, in early life, the bones do not receive their full supply of earthy matter, but are almost entirely formed of gelatine and albumen, and closely resemble cartilage. It has an investing membrane, corresponding to the periosteum of bone. No vessels have been traced into it, and it would appear that it is in a great measure dependent upon those of its investing membrane for nutrition. It is very little liable to absorption, and often from this cause puts a stop to the progress of ulceration. Still, as it is undoubtedly sometimes absorbed, and sometimes also altered in structure, it is inferred that it does possess very minute vessels, although the anatomist has not been able to discover them. As it contains so little earthy matter, it is after death more liable to decomposition than bone; while, on the other hand, from its more limited endowment with blood vessels, it is much less exposed to change during life than this substance.

We next proceed to the tendinous, or fibrous structure. This substance composes the tendons, ligaments, or guiders, as they are vulgarly called; and also several membranes, including the periosteum, or investing membrane of bone; and the various fasciæ, as they are termed, to which many muscles are attached. All fibrous substances consist of delicate white fibres of a silvery or shining appearance. They possess more toughness than any other part of the body, and upon this toughness their utility in the economy seems principally to depend. They afford attachments for the origin of some muscles, and they

Fig 17.



NERVOUS SYSTEM OF AN INSECT. P 44

Fig. 23.



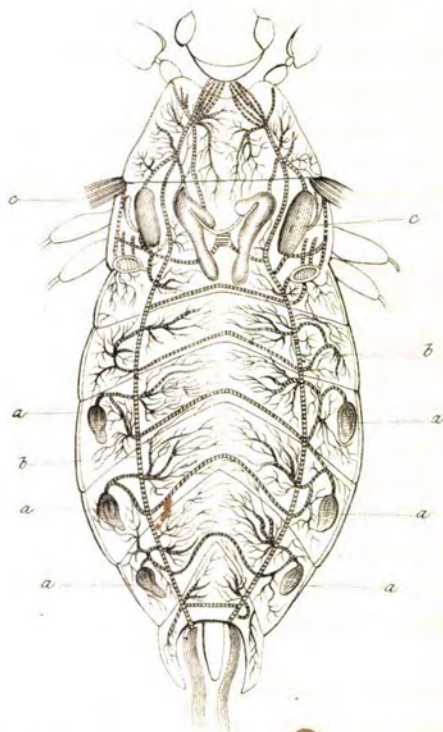
LARVA OF MAYFLY

Fig 16.



NERVOUS SYSTEM OF SCALLOP SHELL.

Fig. 29



RESPIRATORY APPARATUS OF AN INSECT

Fig. 14.



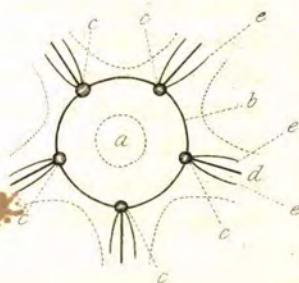
THE PERICARDIUM. P 20-37

Fig. 13.

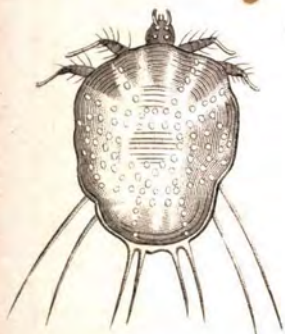


CELLULAR TISSUE. P 37.

Fig 15



NERVOUS SYSTEM OF STARFISH.



ITCH INSECT.

are a medium of connection between muscles and bones, and between bones and bones. Their chemical constitution is principally gelatine and albumen. They are fully provided with vessels, and we have clear evidence that nutrition and absorption go on in them; but still these functions generally take place in them very sluggishly, and fibrous textures, like cartilage, often set a limit to ulceration, and frequently alter the natural direction in which, in diseased states, pus, or matter, would flow.

The cellular tissue is figured in the engraving, Plate V., fig. 13. In this plate, a membrane, *a*, will be observed to intersect, so as to form cells, (some laid open are marked *b*), from which this texture derives its name. It is very generally extended over all parts of the body. It connects the soft parts, and fills up all interstices. Cellular tissue is situate underneath the skin, around and between the fasciculi of muscular fibres, around the vessels and the nerves, around and in the substance of the glands, and, in fact, almost everywhere. Its cells would appear to communicate together; it is kept always moist by a little serous fluid which it secretes; it is admirably adapted, by its tenacity, softness, flexibility, and moisture, for holding together such parts of the body as do not require firm restraint; it contains a large proportion of gelatine, and has a numerous supply of vessels, both absorbents and blood vessels.

In many parts of the body it contains in its cells an animal oil, commonly called fat. When this is the case, the cellular tissue is termed the adipose tissue. This oil is composed of carbon, hydrogen, and oxygen. The adipose tissue is useful in preserving the animal heat, in preventing the ill effects of pressure upon internal organs, and also in serving as a receptacle for superfluous nutritious matter. We are ignorant of the laws which determine its formation in some people more than in others. Adipose tissue is the seat of very rapid absorption and nutrition. We see how rapidly illness, or fasting, reduces its amount, and how quickly it is increased in bulk in persons recovering from wasting sickness.

The serous membrane now requires our attention. When speaking of the heart, we mentioned that it was surrounded by a membrane called the pericardium, or heart's purse. This is a serous membrane, and all the important internal organs of the body are invested in similar envelopes. That of the viscera is called the peritoneum, and that of the brain, the arachnoid. Notwithstanding they enclose these organs, none of them have any aperture. It is not easy to explain how this happens. It is a common practice to liken them to a double nightcap. The diagram of the pericardium (Plate V., fig. 14) may, perhaps, render the matter more intelligible. By means of this arrangement, while the different serous membranes allow vessels and nerves to enter the organs which they invest, they sufficiently surround it. The surface nearest the organ to which they are attached is quite smooth and moist. This mois-

ture is owing to a fluid which serous membrane has the power of secreting, and which, in chemical constitution, corresponds to the serum of the blood, the proportion of animal matter, however, being less. The outer surface is stronger, and serves to give a firm and smooth covering to parts which are in constant approximation, and yet require to be able to move or slide upon each other. These membranes yield gelatine slowly, and long resist putrefaction. In other respects they resemble, in chemical qualities, cellular tissue. They have numerous small blood vessels and absorbents, and are liable to violent diseased action. The quantity of fluid secreted by them is often, in a particular form of disease, very large.

All these textures, bone, cartilage, fibrous texture, cellular tissue, fat, and serous membrane, seem to be useful, owing to their physical properties. They form the framework of the living machine, but they are not directly concerned, either in renewing its waste, or in producing any of its important vital actions. They are the lowest form of animal tissue; and it is a curious fact, that where any of the higher, which we are about to describe, degenerate, or waste away, they are converted into some of these, or rather, perhaps, these take their place. Thus, for example, if from any cause, as paralysis, the muscles of a limb are not used, they are changed into a form of fibrous tissue.

There are, however, other tissues and secretions which perform strictly vital actions. Of these, we have already alluded to the different kinds of blood vessels and absorbents: we now proceed to the rest; and first, to mucous membrane. This is the membrane which lines all those external parts of the body which have external openings—the eyes, nose, lungs, mouth, and, continuous with this last, all the intestines. It also lines all the ducts or vessels leading from the different glands in the body. It derives its name from a fluid which it always secretes—mucus, and which protects it from the irritation which foreign matters passing over it would otherwise produce. This fluid is always more viscid, and less translucent than serum. Sometimes, by disease, its secretion is stopped, in which case the membrane inflames. The membrane itself differs from the serous, in being thicker, softer, and more spongy, in being more completely supplied with vessels, and in having numerous prominences upon it called villi. Being in many places longer than the part to which it is attached, it is necessarily thrown into folds. It is studded with openings proceeding from minute glands, which glands secrete the mucus. Mucous membrane more easily decomposes than any other. The mucus which it secretes contains the animal and saline ingredients of the serum, with the addition of an animal matter peculiar to itself, and to which it owes its viscosity. Secretion and absorption go on most vigorously in mucous membrane. It is very liable to disease.

Still more varied vital changes take place in the glands. A gland is an organ which separates its peculiar fluid from the blood, or perhaps we should

rather say, in which the separation takes place. All glands have vessels called ducts, which proceed from them, and convey the secreted fluid. The simplest form of gland consists merely of a short membranous canal, which opens either upon the skin or the mucous membrane: the glands that secrete the wax in the ear are of this description. These simple glands are very numerous, and from such a simple apparatus very different products are formed. Glands are often placed in clusters. In the larger ones there are a number of tubes, which gradually unite into a large one, and thus form the duct. Sometimes there is more than one secreting duct to a gland. Those of the breast are so coiled together in the nipples, as to allow no egress to their fluid unless they are elongated, which elongation is effected by the art of sucking, or, as in the domesticated cow, by the process of milking. The amount of the secretion of all the glands is very much affected in disease, often very seriously so. Among the most important of the large glands, we may mention the liver, which secretes bile; the salivary glands, which secrete saliva; the pancreas, which secretes a similar fluid; and the kidneys, which secrete urea, a number of salts, and which are besides the means of carrying out of the system superfluous fluid.

With regard to the secreted fluids, the most important division is into those which are destined to serve some further purpose in the economy, and which are called *recrementitious*, and into those which contain matter destined to be expelled from the system, as being no longer useful, but on the other hand detrimental and noxious. These latter are called *excrementitious*.

Among the former, the principal are—the tears which moisten the eyeball, and whose flow, if interrupted, induces fatal inflammation in that organ; the wax found in the ears, the main use of which seems to be, to keep out insects;* the saliva, that moistens and mingles with the food; the secretion of the stomach, which we shall afterwards see performs most important functions in digestion; that of the pancreas, and part of the bile. With the exception of that of the stomach, all these are slightly alkaline. Their chemical constitution is better understood than it used to be, but we do not think it necessary to detail it. A peculiar animal principle has been detected in the bile, but this is probably destined for excretion.

The excrementitious secretions, the continual discharge of which we have before alluded to as a fundamental law of vitality, inasmuch as the body would otherwise be poisoned by them, are four—the portion of the bile just mentioned, the secretion of the kidneys, and the matters thrown off at the skin, and at the lungs. Parts of other secretions besides the bile, are thrown off by the bowels.

The peculiar principle of the bile contains much carbon, a considerable portion of oxygen, a trace of hydrogen, and no nitrogen. By means of this gland, we get rid of superfluous carbon and oxygen. The same function is likewise

* By its bitter taste: the bitters act as immediate poisons to insects.

performed by the lungs; and it is remarkable, that the relative proportion of these two organs bears in the different animals an inverse ratio. Whenever the respiration is rapid, and the organs of respiration well developed, the liver is small; but when, as happens for instance in the molluscous animals, the lungs are small, the liver is prodigiously large.

The substances excreted from the blood at the kidneys, are conveyed from these glands to the bladder, where they remain for some time. The object of this particular secretion seems to be, to convey from the body superfluous nitrogen, in the form of urea, and also those various substances before enumerated, which enter into the constitution of the body in small proportions. It contains a peculiar animal substance, urea, one half of which is nitrogen. It also contains, although in small quantities, sulphates of potash and soda, phosphates and muriates of soda and ammonia, phosphates of lime and magnesia, and two animal acids, the lactic and the lithic. In other words, in it are excreted, in small quantities, sulphur, potash, soda, magnesia, lime, chlorine, and phosphorus. In diseased states, other saline matters are found in it; and it also contains a large quantity of water.

If the kidneys of an animal are extirpated, or if those of a man, from disease, become incapable of performing their proper functions, the urea having no outlet, is retained in the system; and if so, it acts as a fatal poison, producing symptoms not unlike those brought on by a large dose of opium. In like manner, from the diseased state of the liver, the bile sometimes cannot be separated from the blood at this organ, and under such circumstances the retained bile acts upon the economy in the same manner as retained urea, viz., as a deadly poison.

When we come to treat of the respiration, we shall both describe the lungs, and the secretion which takes place at them. We will only mention here, that it consists principally of moisture and carbon, the average daily amount of the latter of which, in a full grown man, is calculated to be about fifteen ounces.

The skin also is a great secreting organ. The skin is, as every one knows, the covering integument of the exterior part of the body, and is continuous with the mucous membrane, which lines the internal cavities. It bears a strong resemblance to this membrane; indeed, in some instances, as in operations about the lip, mucous membrane, if constantly exposed to the air, becomes converted into skin. The skin is composed of three layers—the cutis vera, dermis, or true skin, which lies undermost; the epidermis, or cuticle, which is uppermost; and the rete mucosum, which is situated between the two. The dermis is a firm, and (except in old age) elastic membrane of a reticulated structure. It is essentially composed of fibres, but it is traversed by an immense number of blood vessels, lymphatics, nerves, ducts for conveying away its own secretion, and glands. It is the most sensitive structure in the whole body, and in surgical operations, the principal part of the pain is felt when the skin is cut.

The internal surface of the dermis is in connection with a layer of cellular tissue which lies between it and the muscles; its external surface is covered with a number of little eminences called papilli, each of which contains a little nerve surrounded by a number of blood vessels. It is almost entirely composed of gelatine, and, by the process of tanning, skin is converted into leather.

The dermis secretes the cuticle, which lies above it, and is not a vital part. It has no vessels, and no nerves, and therefore no sensibility: its use is to protect the true skin, the sensibility of which would otherwise be too great. Upon the surface of the lips, and upon the tips of the fingers, it is thin, while upon the palms of the hands, and still more upon the soles of the feet, it is very thick. It is entirely composed of albumen, and as by friction it is much worn, it is constantly being re-formed. Perhaps another use that it has, is to preserve the moisture of the skin by hindering evaporation. It is the cuticle which is raised when a blister is applied.

The nails are appendages to the cuticle, and, like it, have no sensibility; they are composed of albumen, with a portion of earthy matter. Their growth is peculiar: their outer layer is formed by the skin at their root, and pushed forward by continual accretion there, while their inner edges are formed by the skin over which they are placed: the uses of the nails are obvious.

The hair is generally considered as another inorganic appendage to the skin, but it is probably not quite correct to do so. The sudden changes produced in its colour and quantity by mental emotions, generally by those of a sudden and violent character, indicate that nutrition and absorption take place in its substance. Hair contains a quantity of oil, and the action of light upon this substance probably determines the colour. Besides this oil, its chemical constituents are principally sulphur and gelatine.

The rete mucosum is the seat of colour in black men, in whose skins it is easily seen. It is now generally supposed to be the last formed portion of the cuticle, and not a distinct membrane.

The fluid which is visible upon the surface of the skin, is called the sensible perspiration. It consists of water, a peculiar oil, a small quantity of the usual animal salts, and lactic acid, to which it owes its sour taste and smell. The secretions in the inside of the body are, with one exception, all alkaline, and hence it is possible that a galvanic current may exist between them and that of the skin, though we are not aware that any such has ever been discovered.

But when we can perceive no fluid, still the perspiration is continually passing through the pores of our skins. If the hand and arm be confined in a glass jar, the sides of it will be immediately covered with moisture. A similar experiment may be tried by wrapping one's self in a macintosh cloak, and the retaining of the *insensible* perspiration, as it is called, upon the skin, is the cause of the uncomfortable feelings which these articles of apparel often induce

in their wearers. The apparatus for the excretion of the perspiration is simple enough: in the cellular layer, underneath the skin, are placed a number of glands which secrete it; the ducts of these glands pass through the skin, where their orifice is covered by a little flap of cuticle, which is pushed open by the fluid whenever the duct becomes full. The average amount of perspiration varies in a healthy individual from thirty to sixty ounces, in the different climates of Europe, during the twenty-four hours.

The true skin possesses absorbent powers, and foreign substances placed in contiguity to it are rapidly taken into the general system; but as long as the cuticle is attached to it, it is necessary that the substance to be absorbed pass through it, which puts almost an absolute check to absorption by the skin. This is of great practical importance, for if the cuticle did not interfere with the absorbent powers of the skin, all kinds of injurious matters would, in this manner, constantly gain access to the system. Sometimes, when medical men cannot administer medicines in the usual manner, as, for instance, when the power of swallowing is lost, they take advantage of the absorbent power of the skin. To do this they apply a blister, and having by this means raised the cuticle, they remove it, and thus have an opportunity of applying what they wish to the true skin, from whence it is rapidly absorbed.

We cannot conclude this short notice of the excretions, without (although at the risk of being charged with repetition) calling our reader's attention to the systematic series of events constantly occurring in the body. We have seen that although the body be composed of but few elementary substances, yet that it is a law of nature that these substances shall be constantly changed, that nothing can remain vitalized in the body long, and that therefore everything is removed. We have found the blood to contain all these principles, and we have remarked that, by eating these substances, we daily add fresh supplies of them to the blood; we have likewise seen the blood running to all parts of the body and parting with these elements, and we now understand the manner in which, when no longer useful, they are got rid of. The oxygen and hydrogen find an egress by means of the lungs and skin, the carbon by the liver and lungs, and the nitrogen by the kidneys, which also remove the sulphur, phosphorus, soda, potash, lime, magnesia, &c., along with the superfluous fluid.

We have already alluded to muscular fibre, and when we come to speak of locomotion we shall again have occasion to do so. A few observations upon the muscles will not, however, be out of place here. They may be divided into two classes—those of voluntary, and those of involuntary motion: the involuntary muscles, as, for instance, those of the stomach and bowels, are attached to soft parts; the voluntary ones are attached by both ends to bones, lie between these structures and the skin, and form what is commonly called the flesh.

The latter are redder and firmer than the former. That end of a voluntary muscle which is most firmly attached to a piece of bone is called its origin, and the other extremity its insertion. The fibres are differently disposed in different muscles, and are hence divided into straight, radiated, penlike, &c. Muscle contains albumen and gelatine, and a peculiar matter termed osmazome, which should, perhaps, now be called *kreatine*, and which gives both smell and taste to meat. The contractile power of muscles is exerted in three ways: Firstly, to diminish the space of a cavity which a muscle surrounds, so as to expel its contents; we have an illustration of this in the heart: secondly, to draw one part towards another, in which case one of the extremities is fixed, and the other moveable; almost all the strictly voluntary muscles of the trunk and extremities are instances of this: thirdly, to contract and expand adjacent parts, in which case both extremities are fixed; we have an example of this in the muscle called buclator, and which principally forms the cheek.

The only tissue which remains to be described is the nervous, the most important and the most complex of the whole system: to it we now proceed.

The nervous system consists, in the higher animals, of a brain, spinal marrow, and nerves; or, in other words, of large centres and branches. Besides these are other masses, or centres of action, called ganglia. Two different structures enter into the composition of these; a white, or medullary, and a grey, or cortical matter. The former is a fibrous tissue, consisting of fibres lying side by side, and bound together by cellular tissue, and which are discovered, upon examination by a microscope, to be tubes containing a pulpy substance; the latter appears to consist of cells. Besides the common animal substances, the nervous system contains phosphorus and sulphur.

The nervous system of the lower animals differs so widely from that of the higher that no reliance can be placed upon any analogies between the two. Still it will not be uninteresting to take a rapid survey of the arrangement of the nervous masses in the different divisions of the animal kingdom.

In those of the Radiata, in which anatomists have been able to distinguish any nervous system at all, a very simple arrangement is found. Fig. 15, Plate V., represents that of the star-fish: *a* is the mouth; *b* is a ring, composed of nervous ends, forming a communication between *c c c c c*, five ganglia, placed one at the base of each ray. Each of these sends off a large branch, *d*, and two little branches, *ee*: the larger one is supposed to terminate in a sort of eye. The nervous system of the mollusca generally consists of one or two ganglia, placed in the head, or, if there be no head, near the mouth, and supplying the organs of sense with nerves; and two or more ganglia in the body, connected with them, one of these supplying the foot, if there be one, the other the organs of respiration and digestion. The engraving (fig. 16, Plate V.) shows the nervous system of the scallop shell. *A A* are the ganglia near the mouth; although

lying apart, they are connected together by a band. B is a ganglion, from which nerves go to the gills, stomach, &c.; and from another ganglion, C, the foot is supplied.

In the Articulata, the nervous system consists of a ganglion placed in the head, perhaps somewhat analogous to the brain in the vertebrate animals, and a number of ganglia arranged in a cord along the central line of the body, from which nerves pass off. The accompanying figure of the nervous system of an insect requires no explanation. (Fig. 17, Plate V.)

When we come to the Vertebrata, we find a much higher developed nervous system, and for the first time in the animal scale are its principal parts protected by strong bony casings. The ganglia, or central portions to which the ganglia may be supposed to be analogous, are now no longer scattered up and down in the body, but are united to form the brain and spinal cord, the one being contained in the skull, and the other in the backbone. The brain consists of the cerebrum, *a*, (fig. 19, Plate VI.) occupying the front and upper parts of the skull, and divided by the middle into two equal parts, called hemispheres. Beneath and to the back of this, is the cerebellum, *b*, also divided into two hemispheres. The upper part of the spinal cord likewise passes into the skull, and is called the medulla elongata. From this arise nerves which go to the organs of respiration and digestion, and a number of nerves also arise from the spinal cord: they all agree in arising by double roots, the posterior having invariably a ganglion. Fig. 21, Plate VII., illustrates this. These nerves supply the extremities and trunk. The relative proportion in size of these various component parts of the nervous system in the Vertebrata, varies very much in the various orders, the cerebrum increasing in size in proportion to the development of the intelligence, and the cerebellum in proportion to the variety and complexity of the muscular motions. Whenever the brain is small the nervous cord is large, and *vice versa*.

The arrangement and situation of the nervous centres, and of the principal nerves in man, are shown in the Frontispiece (fig. 2): *a* is the cerebrum, *b* the cerebellum, *c* the spinal cord, *d* is the facial nerve, (the principal motor nerve of the face, as we shall see afterwards,) *e* is a network of nerves, called the bronchial plexus, originating in several roots from the spinal column, and dividing into several branches to supply the upper extremity; of these branches, *f* is called the median nerve, *g* the ulnar, *h* the internal cutaneous, *i* the radial, *j* are the intercostal nerves, *k* is a similar interlacing of nerves as the brachial, and is called the lumbar plexus; *l*, another similar one, is called the sacral; from these two, nerves issue to supply the leg. The nerve issuing from the sacral plexus is termed the sacral, and divides into the tibial, *m*; the fibular, *n*; and *o*, the saphenous. All these nerves give off numerous little branches, which supply the whole body.

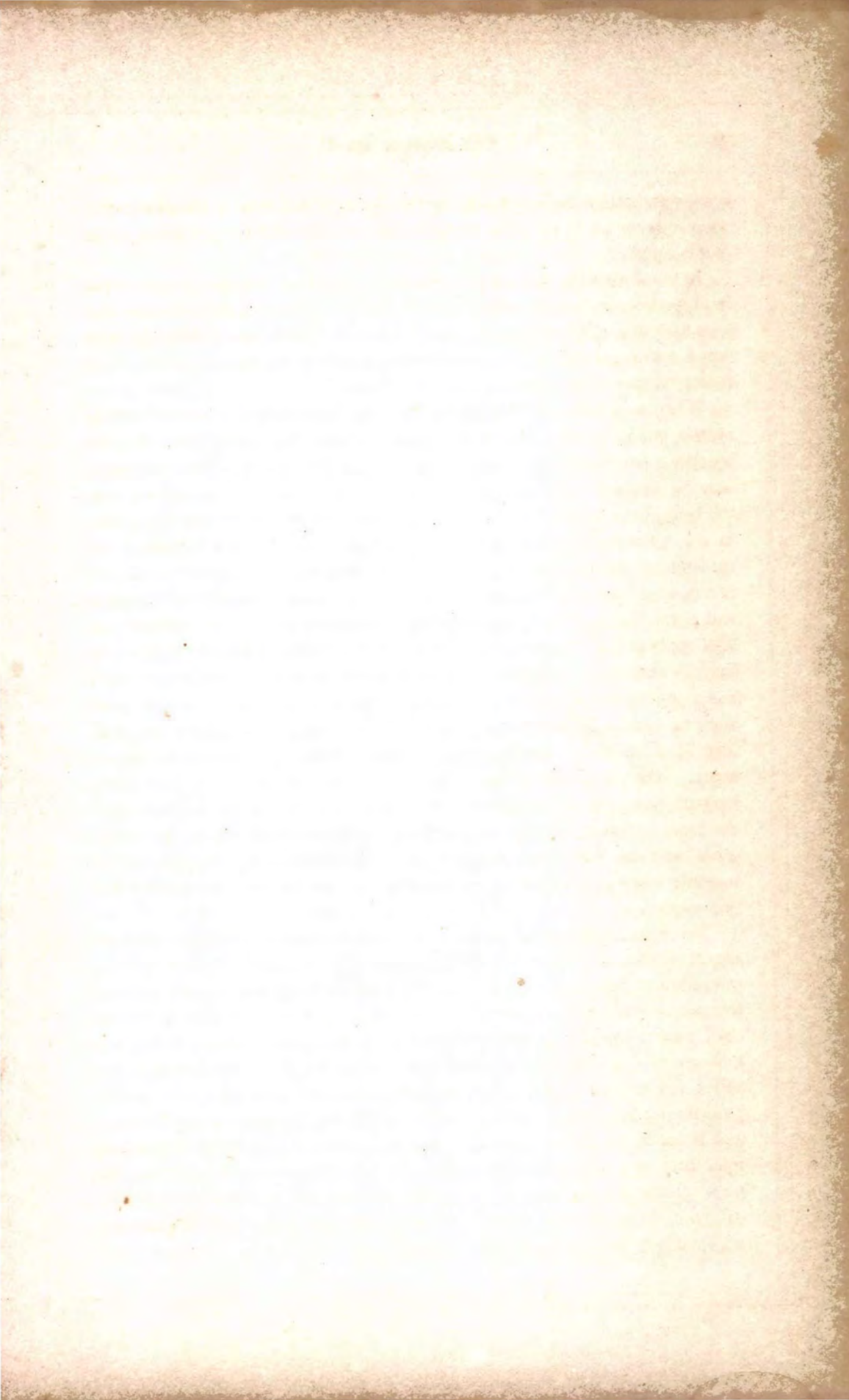
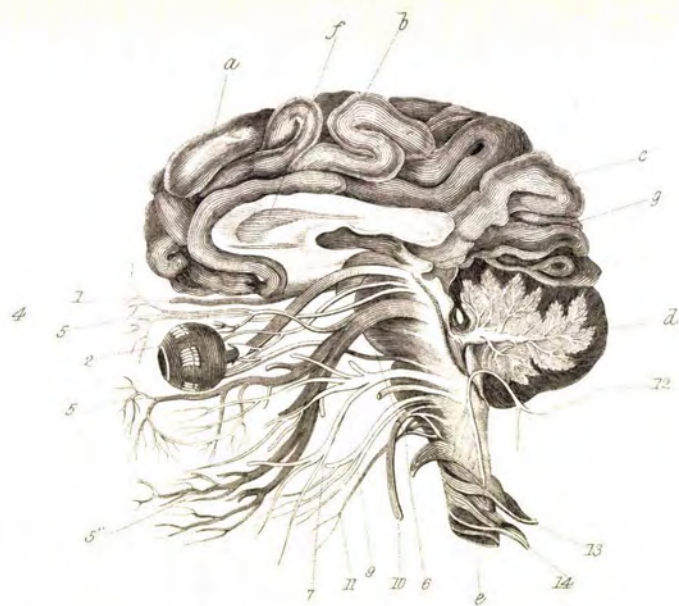


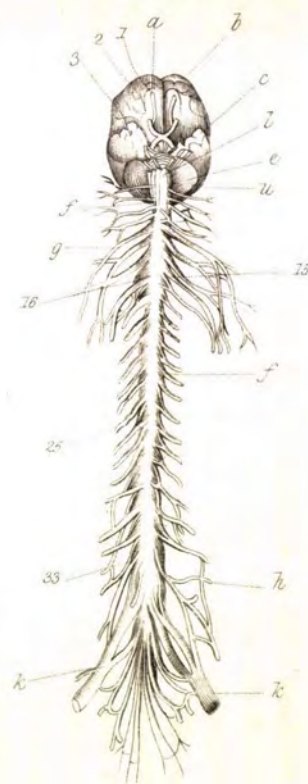
Fig. 20.



BRAIN & CEREBRAL NERVES OF MAN

P. 46.

Fig. 19.



BRAIN, SPINAL CORD & NERVES OF MAN

P. 44-45.

We will now examine the structure of the brain and spinal column, and the nerves which proceed from them. Fig. 20, Plate VI., represents a section of the brain of man, cut perpendicularly down the middle. The outer part is composed of grey matter, and hence its name, cortical, as investing the white or medullary. The cerebrum is composed of three lobes, *a*, *b*, and *c*; *f* is a broad band of fibres, which unites this hemisphere with the other; *d* represents the cerebellum, the arrangement of the grey and white parts of which is fancifully called the tree of life—*arbor vitæ*; *e* is the spinal cord, the upper part of it being termed the medulla oblongata. The nerves are indicated by numbers: 1 is one of the olfactory nerves, which olfactory nerves are called the first pair, and go to the nose, and by means of which we perceive and distinguish smells; 2, one of the optic nerves, or second pair, going to the eye. The third, fourth, 4, and sixth, 6, the two latter of which only are seen, and which are all small, also supply the eye. 5 is one of the fifth pair: this divides into three branches, of which the first, marked simply 5, also enters the orbit, and having distributed branches there, comes out under the eyebrow, and supplies the brow and temples; the second branch, marked 5', passes beneath the orbit into the face, and supplies the cheek, nose, upper lip, &c. &c.; the third, 5'', makes its exit from the skull by a little opening called the foramen ovale, and is distributed to the tongue, the gums, and the muscles of the lower jaw. The seventh pair, marked 7, also supplies the face: underneath it is seen the cut end of the auditory, or nerve of hearing. The glossopharyngeal nerve, 9, supplies the back part of the mouth; 10 is a very interesting nerve, the pneumogastric, which, descending from the brain, supplies the lungs, stomach, and heart; 11 is the hypoglossal nerve, and supplies the tongue; and 12 is called the spinal accessory; 13 and 14 are two of the regular spinal nerves, arising with double roots, the posterior having a ganglion. Some of the above-mentioned cerebral nerves have also a similar origin—these are the third, fourth, the anterior branch of the fifth, sixth, and ninth, all of which have double roots.

We may observe, that although some of these nerves appear to come from the higher parts of the brain, yet they are all connected with the spinal cord, and, in fact, arise from what is called the cerebro-spinal axis, on which the brain and cerebellum are superimposed.

Fig. 19, Plate VI., represents a connected view of the brain, spinal cord, and nerves. It is intended to exhibit the front of the spinal cord, *f f*, while the brain, *a*, is thrown back, so as to expose its base; *b*, *c*, *d*, are its lobes; *e* is the medulla oblongata; *g*, *h*, and *k*, are the brachial, lumbar, and sacral plexuses. The nerves, from 8 to 14, are the same as those just described; 15 and 16 are nerves from the upper part of the neck, or cervical region; 25, a pair from the dorsal; and 33, a pair from the lumbar.

Besides this system of nerves, called the cerebro-spinal, there are a number of

ganglia, in front of the backbone, which communicate with two ganglia lying along the intestines, and also with the posterior roots of the spinal nerves.

Nutrition and absorption evidently take place in nervous tissue, but it is not probable that very frequent change is made in its substance in the progress of life. It is certain that injured parts of it may be repaired by materials that will assume the peculiar properties which it possesses, and which properties, having described its anatomy, it is now time to consider.

Upon applying stimulants, principally mechanical impulse and galvanism, to the nerves leading to certain muscles, these muscles are contracted, and this happens although all communication be cut off between the point of the nerve which is irritated and the brain. Upon irritating the nerves which supply other muscles—as, for example, the heart—no contractions whatever are produced. It has been farther ascertained, that to the former of these belong all those muscles which we can at will contract, and that, to the latter, appertain those over whose contractions the mind has no power.

In the muscles, however, which do contract upon irritating the nerves which supply them, it has been ascertained that the phenomena do not take place upon the irritation of all nerves going to them, but only upon the irritation of certain of them. No muscular contraction happens consequent upon irritating the posterior roots of the nerves arising from the spinal column, or one portion of the fifth nerve, or the nerves of special senses, while strong contractions may be excited in this manner through the anterior roots of the spinal nerves, and the third and fourth anterior portion of the fifth, the sixth, the eighth, and the ninth.

Another very curious fact relative to the excitement of muscular contractions by physical excitement of their nerves, has been in a manner discovered, and much dwelt upon, by Dr. Marshall Hall. It is termed the reflex function. It is, that in certain cases irritations applied to nerves, and particularly to extremities of nerves at distant parts, chiefly on the skin or mucous membrane, excite such contractions. It is necessary that the nerves irritated shall have their origin in the posterior roots of the spinal cord. We shall very soon see that these are the nerves to which the faculty of sensation belongs. Movements of muscles produced by tickling the soles of the feet, are an example of this reflex function. It is necessary to observe, that Dr. Hall considers that these movements are independent of sensation.

The muscles which have nerves from the spinal cord are excited to contraction, not only by irritation of these nerves, but of the spinal cord itself. Similar contractions have often been observed to follow injuries, or irritations of the nervous substances in the skull, but it is only so when the injuries extend so as to affect the medulla oblongata, either directly or indirectly. Much of the brain may be violently irritated, and no muscular contraction produced. Curi-

ously enough, when such contractions are observed, they are upon the opposite side of the body to that upon which the injury is sustained. The same we shall find to occur in paralysis of one side caused by disease of the brain. In such a case, the diseased side of the brain is the opposite to the paralytic side of the body.

While speaking of the effects produced by physical causes acting upon the nervous system, we must remark, that all the contractile powers of the solids are, in this way, liable to alteration. This is a subject which, although not well understood, is of great importance in pathology. It seems to be ascertained, that great mechanical injury to a portion of the brain, or spinal cord, diminishes, or even instantly arrests the heart's action, and that the flow of the blood is more weakened in the capillaries than in the large vessels; and we see precisely the same result brought about in the human frame from accident or disease. Thus the circulation sinks after violent concussion, and in diseases where portions of the nervous system are suddenly affected, as in some cases of apoplexy, and in water in the head. Slight injuries, either of the brain or spinal cord, on the contrary, quicken the heart's action.

When speaking of nutrition and secretion, we mentioned facts which proved that these exist independent of nerves; but still, physical injuries and impressions on the nervous system do affect and influence them. Thus, if the fifth nerve be cut, inflammation, ulceration, and mortification of the eye, and of the inside of the nose, comes on, these parts being supplied by this nerve. The true explanation of this seems to be, that if mucous secretions do not shield these parts from the irritation of foreign matters, inflammation and its consequences manifest themselves; but these secretions are habitually excited by sensations produced by irritations, and then, when the nerve is cut and the sensation destroyed, they cease to be secreted.

We will not weary our readers any longer with statements of phenomena brought on in the animal economy, evidently by powers of the nervous system, or detail any more effects produced by irritation, or injury of portions of it. Enough has been said to prove that the nervous system possesses very peculiar powers, which will immediately be considered. Before doing so, however, we must allude to a theory which has been promulgated, as being an explanation of these powers. It has been supposed that they are owing to galvanism evolved in the animal frame by contact between muscle and nerve. This is the more probable, because we know that by this contact galvanism really is evolved, and that it is a powerful stimulant of muscular contraction, although, in an excessive degree, it is a powerful sedative, and that it really does appear to have some influence over the secretions.

But it may safely be stated that this galvanic theory is not correct. The causes which excite violent muscular contraction, as pricking a nerve with a

pin, or nipping it with forceps, are quite inadequate to produce sudden and violent galvanic action. Besides, we have seen that the contractions occur upon irritating one set of nerves, but not upon irritating another; whereas the galvanic action would be equally produced in either, and both are equally capable of transmitting it. Farther, no galvanic action can, by the finest galvanometer, be detected in a nerve, when some change consequent upon its being irritated is transmitted along it, and is exciting a muscle to contraction.

In fact, all that we can say with safety upon the subject is, that nerves act upon muscles in the living body, in consequence of certain living powers which they possess. Such may be attributed to what is called nervous power, or nervous agency.

CHAPTER VIII.

THE ANIMAL FUNCTIONS IN GENERAL.

WE have seen that the nervous system possesses peculiar vital powers, and we have further observed various phenomena produced by physical causes acting upon it. These were, however, the result of violence and injury, and we have no reason to believe that they are brought on by such means in the healthy body: they are merely indications of the powers given to the nervous system, in order that it may be the seat and instrument of mental acts. These mental acts, and those functions of the body in which they are concerned, constitute the animal functions, as they are called,—and to these we now turn our attention.

Before describing individual animal functions, it will be useful to make a few general remarks which apply to them all, and also to state what has been done as to appropriating different parts of the nervous system to different mental phenomena.

The mental phenomena concerned in the functions of animal life, are sensations, as smell, heat, uneasiness, &c.; and such acts of thought as are followed by changes in the body—these latter being instincts and volitions. We wish to move a limb, for instance, or any part of the body, and we know that we can move it or not as we please: this is what we call volition. We see also that there are motions of such parts of the body as we can move voluntarily, which occur without our willing them, over which we have no control, but which we are conscious of, such as sneezing, laughing, vomiting: these are preceded, and doubtless caused, by sensations or emotions. Then, again, there are instinctive actions, not necessarily connected with sensations, of which we are conscious,

but which we perform involuntarily, such as shutting our eyelids to protect our eyes, in some measure gratifying our appetites, &c.

There is no doubt that the nervous system is essentially concerned in all these phenomena. All sensation, and all voluntary and instinctive motion, is immediately destroyed in any part of the body, if the communication of its nerves with the cerebro-spinal axis be cut off; and all sensations and motions produced in the body by them and the will, are altered and destroyed by injuries and diseases of the nervous system. Very similar changes are in this manner brought about in the muscles and glands, to those produced by physical irritation of the nerves.

The nervous system requires that certain conditions shall be observed, in order that it may exhibit its peculiar properties. The most important of these is a constant supply of fresh arterial blood. This is indeed necessary to all textures; but in none is its interruption, for even a short time, so rapidly injurious. This particularly applies to the higher animals; as some of the cold-blooded, the frog for instance, can live some time after the heart has been cut out. A curious fact connected with the nervous system is, that any sudden alteration of the pressure upon it produces diminution or suspension of the animal functions: this is exemplified in the fainting produced by abstracting a little blood in a common bleeding. Persons who have had pieces of their skull depressed by a blow, have been known to sink into insensibility, from which they recovered upon the bone being restored to its natural position. There are many instances of similar effects being produced by increase of pressure.

The investigations of the late Sir Charles Bell determined some very important facts with regard to the appropriation of different parts of the nervous system to *sensation* and to *motion*, whether voluntary or instinctive. His conclusions have been confirmed and added to by subsequent physiologists, and we now proceed to give a brief summary of them. In the first place, it is clearly ascertained that there are no sensations which are felt in all nerves; but that there are certain nerves, or nervous fibres, in all parts destined for sensation, and certain others again which are not, but, on the other hand, intended for exciting motion. The latter are called motor nerves, or nerves of motion; and the former, nerves of sensation.

With regard to the spinal nerves, it has been ascertained that, upon irritating the posterior roots, or the posterior portion of the cord from which they arise, indications of pain (that is, of common sensation) are felt; and by section of these roots, insensibility is produced in the parts which they supply. On the other hand, upon irritating the anterior roots, and the anterior portions of the cord, muscular contractions are induced; and if these anterior roots be cut, palsy or loss of power of motion comes on. The reason that the spinal nerves minister both to sense and to voluntary motion is, that after the union of the

two roots, the nerves which branch off have bound up, in the same sheath, different fibres of the two with different endowments.

We may state generally the distinction between the motor and sensitive cerebral nerves. The third, fourth, and sixth are nerves of motion, and supply the muscles which move the eyeball; the two first branches of the fifth are nerves of sensation, endowing the eyeball, forehead, cheek, upper lip, &c., with sensibility; while its third branch possesses a motor root, which supplies the muscles of mastication with the power of motion; the seventh and the ninth are motor nerves. The large nerves supplying the eye, nose, and ear, are of course nerves of sensation, but of peculiar sensation. Under the chapters upon RESPIRATION and DIGESTION, we shall have occasion to notice the others.

Various facts prove that there is a transmission of some change through the spinal cord, upwards to the brain in sensation, and downwards from the brain in motion. Thus, after amputation of a limb, pains are often experienced which are referred to parts which have been removed—to the toes, for instance, in amputation of the leg. This implies that the sensations in these parts had been dependent upon changes which occurred, as far removed from them, at least, as the place where the cuts were made which separated the limb. Again, after section of the cord, there is loss of motion and sensation in all parts supplied with nerves from the cord below the section; yet, by physically irritating these nerves, contractions are excited which proves that the loss of voluntary motion does not depend on the nerves being unable to act upon the muscles, but upon the brain or upper portion of the spinal cord being unable to act on the nerves, and therefore, that when the communication is entire, the brain or upper portion of the cord does act upon the nerves.

We before stated, that impressions upon the extremities of nerves (sensitive) transmit an influence to the spinal cord which acts upon the motor nerves, and produces contraction. It has been supposed that this takes place in the higher animals independently of any sensation, and accounts for many regular combinations and successions of muscular movement. This has been denominated the reflex function, and great stress has been laid upon it by Dr. Marshall Hall and other physiologists. We believe that, in the natural state, and for all useful purposes, sensations interfere, and are the causes of the action of the motor nerves. But the fact, that impressions upon the extremities of the sensitive nerves produce sensations which set in operation the motor nerves independently of our will, is a very important fact, of which we shall see many illustrations. To this limited reflex function we purpose, in the subsequent pages, to restrict the term *reflex function*.

We now proceed to the consideration of the functions of Respiration and Digestion, the purposes of which are to maintain the requisite quantity and quality of the circulating fluid, whose presence in such a state is necessary, as

we have before seen, to the maintenance of vital powers of all parts of the system, and particularly to that of the nervous tissue. We must admit that these processes go on in the vegetable world, and that many of these phenomena, even in man, strictly belong to organic life; but still the reception of food into the stomach, and of air into the lungs, is accomplished by movements which take place in consequence of volitions and sensations of which we are conscious, and which depend upon the nervous system.

CHAPTER IX.

RESPIRATION.

WE have often had occasion to speak of the necessity of the blood being exposed to the air, in order that it may be arterialized. This is, in the higher classes of animals, of such vital importance, that its suspension even for a few moments is fatal: it is not, however, so instantaneously injurious to the cold-blooded animals. Indeed, the intensity of the vital actions, the development and activity of the nervous system, and the power of the muscular contractions generally, bear a relative proportion to the intensity of the action that takes place between the blood and the air.

The atmosphere is composed of oxygen and nitrogen. We may here state, leaving details to a later part of this chapter, that during respiration the air which is inhaled loses its oxygen, and acquires an equal volume of carbonic acid gas. This is a gas which, if breathed, proves fatal to all animals. It is not so, however with vegetables; they absorb the carbonic acid gas, and substitute oxygen: and in this manner the atmosphere is purified.

The various contrivances for effecting the arterialization of the blood afford, in the different classes of animals, perhaps the most beautiful illustrations that can be found of Natural Theology. We must be content with taking a very brief survey of them.

It may seem strange to some of our readers, when they reflect how many animals live in the water, to say that all animals must breathe air. Such is, however, the fact. Water contains a considerable portion of air mixed with it, and this may be expelled by boiling. If a fish be placed in water so boiled and then cooled, it dies, just as man would do in similar circumstances, from want of air, or from suffocation.

The zoophytes have no organ appropriated for respiration, but the air is admitted freely to all parts of the body. The same is the case with the insects, although an express provision is made for introducing the air into the body. In

them, cavities, termed stigmata, are found (Plate VII., fig. 22, *a a*), which freely communicate with the atmosphere. These stigmata open into canals which lead into the two trachea, *b b*, that run along the sides of the body, and which are connected with each other by several tubes running across the body. From these trachea others branch off, which, with their subdivisions, permeate all parts of the body. In the more perfect ones, the trachea are at points dilated into air-bags, *c c*, being the largest in those insects which are intended to sustain long flights: in the common bee, for example, they are very large. Their object would appear to be twofold: the motion during flight partially closes the stigmata, and hence these air-bags serve as a reservoir of air; they likewise render the body more buoyant. Other members of the articulatæ have somewhat similar contrivances for exposing their blood to the air.

In the other divisions, there is a separate apparatus provided for respiration, so constructed as to present a great many surfaces where the blood may meet the air. When this is situated in a cavity within the body, and connected with the mouth, it is called a lung, and when placed externally, a gill. The simplest form of gill is exemplified in the accompanying engraving, which represents the larva or caterpillar of the May-fly (Plate VII., fig. 23). In the little tufts at the side and at the tail, are gills in which the air acts upon the nutrient fluid of these little creatures. The most perfect example of gills are to be found in fishes: they are situated, as every one knows, in rows at each side of the throat, with two sets of apertures, the one opening upon the outside, and the other communicating with the throat; a continual stream of water passes through them. Our readers, of course, remember that the heart sends the blood to these organs. The act of respiration can only take place when the gills are moist; and when a fish is taken out of the water, the gills clog and become dry, and hence it dies of suffocation. If, however, care be taken to keep them moist, the breathing can go on without difficulty out of their native element. Some of the fishes, and also of the molluscous animals (which are likewise provided with gills), are destined to spend occasionally some time in the air. To enable them to breathe upon such occasions, we find a most ingenious contrivance: the bones of the back of the mouth are so constructed that a number of cavities are formed, and these serve as reservoirs of water, which keep moist their gills during their residence in the air. Most of the fishes that are so provided for, are inhabitants of tropical climates, where the shallow lakes often dry up; and when this happens, they are thus enabled to change their quarters. One of, if not, the most singular instance among them, is the *Anabas*. This fish, somewhat resembling a perch, and like it provided with spines, actually sets out of the water, and, by means of its spines, climbs bushes in search of its prey, a species of land crab which is to be found in such situations.

Reptiles are provided with lungs communicating with the mouth. They

Fig. 24.

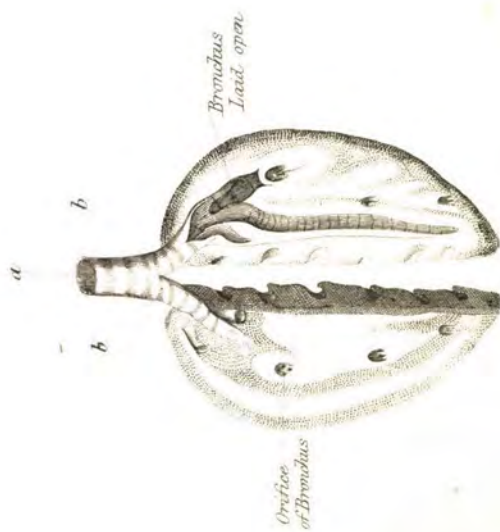


Fig. 25.

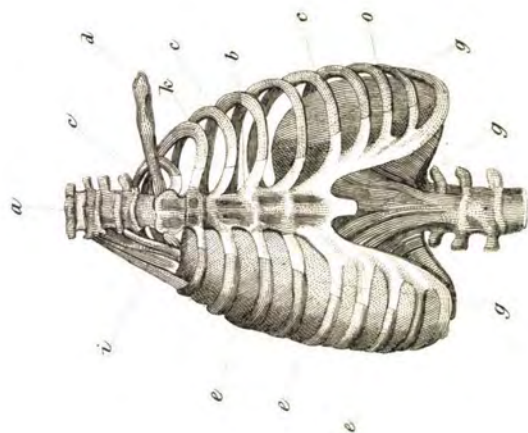
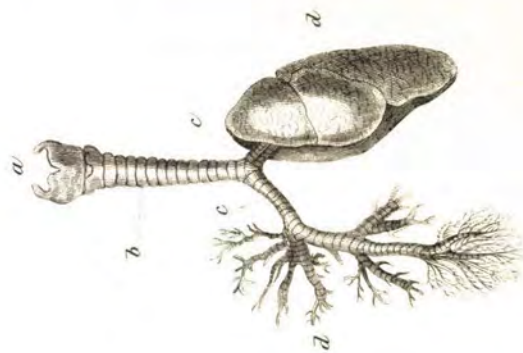


Fig. 26.



LUNGS OF A BIRD.

HUMAN CHEST.

HUMAN LUNCS.

are not able to inhale the air in the manner that animals do, but they swallow it. As they have only one heart, only part of the blood which is circulating through the body can have been exposed to the air, and hence their cold blood and lowly developed nervous system and vitality in general.

The birds have perhaps a more active respiration than any of the mammalia, and this is doubtless owing to their having occasion for great muscular energy. Fig. 24, Plate VIII., represents their respiratory organs. The trachea, *a*, or windpipe, divides into two bronchi, *b b*, which, subdividing, form very minute air capillaries, and the blood in its capillaries is acted upon by the air in these. The air which enters by the windpipe, not only passes into the lungs, but, by means of the bronchial tubes, goes on into air cells disposed in various parts of the body, which communicate with the interior of the bones. These are found larger in those birds intended for active and prolonged flight. They resemble, in principle, the air cells of insects, and are doubtless intended for the same purposes—the diminishing the specific gravity of the body, and serving as reservoirs for air.

In man, and all the other mammalia, the lungs are contained, along with the heart and great vessels arising from this organ, in a shut cavity, called the thorax, bounded above and at the sides by the ribs and their muscles and attachments, *c c* (Plate VIII., fig. 25); that is, before, by the ribs and breastbone, indicated by *k*; and below, by the strong muscle called the diaphragm, *g*, which completely separates the thorax from the abdomen, and which is attached to the backbone and to the inner side of the ribs. It is obvious that this cavity can be much enlarged: by the contraction of the diaphragm it can be lengthened, and by the elevation of the ribs (which are attached to the spinal column by moveable joints) it is rendered deeper and broader. The lungs are suspended in this cavity, and are covered by a serous membrane called the pleura. They are two in number, each of a conical figure, with its base resting upon the diaphragm, and its apex extending to a little above the first rib. Each lung is divided into lobes—the left into two, and the right into three. The annexed engraving (Plate VIII., fig. 26) represents the anatomy of the human lungs. *a*, is the larynx opening into the back of the mouth: when treating of the voice, we shall have occasion to consider its construction more minutely. We may mention here, that the contact of anything which would be injurious to the lungs, stimulates the orifice of this organ to violent contraction. We have a familiar instance of this in the choking produced by a drop of fluid touching it, or, to use a common expression, “going down the wrong throat.” The windpipe is marked *b*, and is seen to divide into other tubes, which are called bronchi, and marked *c c*. These divide and subdivide, as shown at *d*, into very minute little bronchial tubes or air passages, which do not average the one hundredth of an inch in diameter. The lung on the other side, *d*, represents its natural appearance.

The first step in the process of breathing is a sensation felt in the chest, and which is caused by venous blood circulating in the lungs. This, if not relieved soon, becomes extreme agony. This sensation has the same influence during sleep as in the waking hours, and always prompts to the act of inspiration. Other sensations besides this produce a similar effect: that brought on by cold suddenly applied to the face or breast, is an example.

This sensation is naturally, in the first place, dependent upon the sensitive nerves of the lungs, and particularly on those which communicate with the medulla oblongata, through those derived from the pneumogastric. Accordingly, it has been found that certain physical irritations of these nerves do excite inspiration, and section of them renders it slow and imperfect: and probably it would stop it altogether, were it not that the lungs have other communications with the brain. Injury of the medulla oblongata, from whence these nerves originate, immediately puts an end to all respiratory movements, no doubt because an end is put to the sensation which prompts them.

The objects of the movements which the sensation prompts to, are to expand the cavity of the chest, (in which case air, of course, immediately rushes in,) and to hold open the passages through which the air can enter. The former of these is, as we have seen, effected by the contraction, and consequent descent of the diaphragm, which deepens the chest; and, by the contraction of the intercostal muscles (the lower ribs being more moveable than the upper), the ribs are elevated, and thus the chest is expanded. Other muscles also assist in the elevation of the ribs, but it is needless to advert to them. The nostrils are slightly expanded, and the orifice of the windpipe kept open by the contraction of its own muscles. The force and the rapidity of all these movements are under the control of the will, and can at pleasure be performed separately or in conjunction, excepting when the sensation becomes unusually intense, which it always does if the movements be delayed; in which case the will is entirely superseded, and inspiration takes place independently of it.

The action of the diaphragm, or that of the intercostals, is individually sufficient to carry on the respiration, and in disease we frequently find this to be the case. In affections of the bowels, when the descent of the diaphragm would produce pain, only the ribs are used; and in diseases of the pleura or lungs themselves, where the motion of the ribs would be painful, the diaphragm alone expands the chest.

The act of inspiration is immediately succeeded by that of expiration. In ordinary circumstances, this requires no muscular effort; it is the natural effect of the cessation of those muscular contractions which produce inspiration. But when the sensation produced by the presence of venous blood in the lungs has been more than usually intense, the diaphragm and ribs are brought back

to their position with rapidity and force, and the thorax is contracted into less than its ordinary limits.

These movements of inspiration and expiration take place, on the average and in the healthy state, about once for every four pulsations of the heart, and, therefore, about sixteen or eighteen times in a minute.

When we see that the diaphragm and intercostal muscles are the principal agents in effecting these movements, we are naturally led to inquire, what effect the motor nerves of these muscles have in producing these contractions. The intercostals are supplied with motor nerves from certain of the spinal nerves, and the diaphragm by the phrenic, a nerve which arises from the third and fourth cervical, and descends along the front part of the chest. Accordingly it has been found, that division of the phrenic nerve prevents the action of the diaphragm, and that section of the spinal cord, above where the nerves for the intercostal muscles come off, prevents the contractile power of these muscles; while division of the spinal cord, above the origin of the phrenic nerves (*i. e.* above the origin of the nerves supplying both intercostals and diaphragm), palsies the respiratory movements immediately, and so causes sudden death.

When the air has passed through the bronchi, and is permeating the small air tubes, we can, by applying the ear, or a stethoscope, to the chest, distinguish a gentle murmur. This is termed the *respiratory murmur*. Of course, if any part of the lungs should, by disease, become impervious to air, this will not be heard; and it can readily be imagined that many diseases, particularly if attended by morbid effusion, will materially modify it. In fact, the discovery of this has been of so great advantage to the physician, that he is now able to discriminate, by the act of auscultation, many diseases of the respiratory organs, which were before completely beyond his power of diagnosis.

The average quantity of air taken into the lungs at each inspiration, is supposed to be about twenty cubic inches. If we reckon that sixteen inspirations take place in a minute, about twenty thousand cubic inches will pass through them in an hour, and more than two hundred and sixty-six cubic feet in a day.

It is obvious that a membrane must intervene between the blood in the capillaries of the lungs and the air; but it is evident that this can offer no bar to the action of the one upon the other, inasmuch as, in various other instances, absorption of gas takes place through a membrane in the living body. Indeed, out of the body the same thing can be effected; and if venous blood be placed in a bladder, and exposed to oxygen, it becomes scarlet, and evolves carbonic acid.

We will now allude more particularly to the nature of the change which takes place in the air at the lungs. In the first place, the oxygen of the air disappears. The proportion of nitrogen is generally the same as in unrespired

air, but sometimes it is greater, and sometimes less; and it is therefore inferred, that there is, to a certain degree, both a constant absorption and exhalation of this element. The quantity of carbonic acid in breathed air varies, according to the intensity of the respiration, from three to ten per cent. The whole quantity of carbonic acid given off by an adult in twenty-four hours, and under ordinary circumstances, has been calculated to be forty thousand cubic inches, which would weigh three pounds, and contain about eleven ounces of pure carbon.

Our readers are aware, that carbonic acid is a compound of carbon and oxygen; and it was formerly supposed that it was formed in the lungs by carbon being secreted there, and there uniting with the oxygen of the air; but this is now proved to be an incorrect opinion. The cold-blooded animals can be kept for a considerable length of time on hydrogen or nitrogen, and, when so confined, they continue to give off carbonic acid from the lungs, which proves that the carbonic acid had been formed in the system previously to excretion.

The amount of watery vapour exhaled from the lungs in twenty-four hours, has been supposed to amount to twenty-four ounces. We formerly stated that the loss to the system, in this way, was about fifteen ounces. There is, therefore, a considerable amount of absorption habitually carried on at the lungs.

We stated, at the commencement of this chapter, that the vitality of the animal actions, and the activity of its respiration, were proportionate; and that those animals in which the respiration is most active, can least bear, for a short time, the absence of air, and *vice versâ*. Some of the cold-blooded animals can be frozen, and kept in that state for years, and yet retain the power of resuming their animal functions when the temperature is lowered. Even among mammalia, there are many animals which pass the winter in a state of insensibility, in which state the respiration is scarcely carried on. Such hybernating animals may be altogether deprived of air, for a time, with impunity: they may, for example, be kept under water for an hour or more, although, in a state of activity, this would kill them in at least three minutes. It is probable that man (who drowns in two or three minutes) sometimes falls into the water in a state of insensibility, as in a faint from emotion, or produced by a blow upon the head, and that, under these circumstances, he can bear the want of air longer. At least this seems the only explanation of the cases which have occurred of recovery from drowning, when there was good evidence to induce us to believe that the body had been under water for a considerable period.

CHAPTER X.

ANIMAL HEAT—LIGHT AND ELECTRICITY.

MAN, and probably all the members of the animal creation, have the power of generating heat within themselves, and of thus maintaining a higher temperature than the inanimate objects which surround them. Even the animalculæ found in water possess some degree of this power, as when that fluid is frozen they do not at once die, but continue to live in a small uncongealed space, apparently kept so by the warmth generated by them. Fishes maintain a temperature a degree or two higher than the water in which they live, and some species, as the thunny, as much as twelve degrees higher. Most reptiles have a still greater power of keeping up an uniform temperature, particularly when the element surrounding them is reduced low. In ice, which was twenty-one degrees, or eleven below the freezing point, a frog has been ascertained to have a temperature of thirty-seven degrees. Insects have the power of generating a great deal of heat, especially at particular times. A humble bee, fresh captured, was placed in a phial, where it remained in a state of great excitement; and its temperature, which, in a natural state of quiet, is two or three degrees above that of the atmosphere, soon arose to nine above it. What is still more extraordinary, beehives are commonly from five to twenty degrees higher than the air surrounding them, and if the inmates be suddenly aroused, much more. In one instance, the temperature of a hive was raised, by arousing the inmates, who were in a torpid state, to a hundred and two, while the thermometer, in a similar hive, that had not been disturbed, was only forty-nine, and, in the air, thirty-five degrees.

It is, however, in birds and mammalia that we find an elevated temperature constantly and systematically kept up. That of birds varies from a hundred degrees (that of the seagull), to a hundred and twelve (that of the swallow). That of mammalia would seem to range, under ordinary circumstances, from ninety-six to a hundred and four. That of man is generally stated to be a hundred; but there is no doubt that it may vary five or six degrees without becoming morbid. In disease, its variations have been greater, sinking to twenty degrees below its standard in Asiatic cholera, and rising to a hundred and ten in locked-jaw.

Feathers, furs, &c., serve to retain in the body the heat which it has generated: they do so by their quality of being bad conductors of heat, and act just as artificial coverings on the human species do. A curious contrivance

is found in ducks and other aquatic birds: their bodies are covered with a soft and thick down, which is rendered impenetrable to fluids by means of an oily secretion, laid on by the bill, and which forms, in fact, a natural macintosh.

The young of warm-blooded animals have, in general, much less power of generating heat than the adults, and would perish with cold were it not for the artificial heat communicated to them by the proximity of their parents. The temperature of new-born puppies, for instance, removed from their mother, will sink to between two and three degrees above that of the surrounding atmosphere.

The cause of animal warmth was, for a long time, a very perplexing topic to physiologists, and many vague and unfounded hypotheses were held respecting it. It is now, however, perfectly well understood. Combustion, and the heat which it produces, are, in animated bodies, caused by the combination of oxygen and carbon. Indeed, whenever these two substances meet, heat is evolved. Since the discovery of this fact, the animal temperature, or, at any rate, the greater part of it, has always been referred to the union of these two substances to form the carbonic acid of the expired air. In support of the truth of this opinion, many illustrations might be given. We select two animals in a state of winter torpor, having their respiration very low, and their animal heat proportionately low: if, however, they are roused, their temperature rises, and just in proportion as their respiration becomes more frequent and fuller, *i. e.* when the union between carbon and oxygen goes on more rapidly. Again, our readers are probably aware that, after apparent death, the circulation can be kept up by artificial inspiration: now the effect of this, which is just blowing with a bellows *cold* air into the lungs, is to retard instead of accelerating the cooling of the body.

When it was thought that the union between the carbon and oxygen took place at the lungs only, it was difficult to understand how a cause limited to one organ should produce an elevation of temperature which is general over the whole body; and, accordingly, a very ingenious hypothesis was invented by Dr. Crawford to explain it. We, however, saw in the last chapter, that it is now ascertained that the calorific change is not confined to the lungs, but extends over the whole body.

Serious doubts may be entertained if the whole animal heat is to be attributed to the formation of the carbonic acid which is expelled in expiration. Very careful experiments were made to clear up this point. A box, containing a small animal, was placed under water; the air which it inspired and expired was measured; and the elevation of the temperature of the water compared with the evolution of carbonic acid from the lungs was observed. This was again compared with the caloric evolved by the combustion of a certain quantity of pure charcoal. The result was, that not quite all the animal heat could be

accounted for in this manner; probably the remainder is to be attributed to the various chemical changes attending secretion and nutrition. Extensive injuries of the nervous system diminish the temperature, probably from the power we have seen they possessed of modifying these secretions.

Voluntary increasing or quickening of the acts of respiration does not increase the animal heat; but exercise, by promoting the circulation, causes a greater action between the blood and the air, and materially does so.

Animals not only possess the power of maintaining their own temperature when the surrounding atmosphere is colder than themselves, but also when it is hotter: slight instances of this, in very hot weather, must be familiar to all our readers. Individuals have, however, remained, for a short time, in air heated to a great intensity with impunity. Many workmen are occasionally exposed to a heat of from two to three hundred degrees: those of Chantrey used to enter a furnace where the thermometer indicated a heat of three hundred and fifty, and Chabert, the fire-king, was in the habit of exhibiting himself in a large oven heated up to six hundred degrees. During some experiments, where the people were placed in a very hot atmosphere, their temperature was found not to rise more than four degrees. The cause of this depends upon the evaporation of the perspiration, which, under such circumstances, is most profuse.

This appears to be as good a place as any for saying a few words regarding animal luminousness and electricity.

Several animals have the power of emitting light. The phosphorescence occasionally seen in the sea, depends upon the presence of a number of zoophytes, which have the power of secreting a mucus that produces the luminousness. Several of the mollusca, also, possess a similar power; but the most curious examples of it are to be found in some insects, as in the fire-fly of the New World, or in the glow-worm of our own country. The light in the fire-fly proceeds from two minute but bright spots, situated upon the sides, and from another beneath the hinder part of the thorax: it is so brilliant as to enable a person, by its aid, to read, in profound darkness, the minutest print. They are used by the natives of the places where they occur to illuminate their houses, and, when travelling in the night, they tie them to their bodies to give light to their path. The glow-worm is familiar to most of the inhabitants of the southern portion of our island. The light is most strongly displayed in the female, who is vernacularly, but improperly, termed a *worm*: she is, in every respect, an insect. The light issues from the under surface of the extremity of the body, and consists of little granules, contained in minute sacs, and covered with a transparent lid, with various surfaces, which disperse the light. These sacs are supplied with air from a trachea, and it is probably by closing this that the animal puts an extinguisher upon "its

candle." Some most extraordinary statements have been made, in which lights have been asserted to have been seen playing about the human features a little before death. Animal luminousness has no connexion with vitality, but depends upon the chemical constitution of some secretion doubtless containing phosphorus. It has been supposed, with great probability, by Dr. Carpenter, that many insects evolve light, but in a low degree, and which is appreciable to themselves, but not to us. The love which some of them have for approaching light, is exemplified in the fatal determination of moths to come near the flame of a candle.

Curious instances of the production of electricity in the human subject have been narrated. It seems, too, to occasionally accumulate in animals that have thick furs. By rubbing a cat's back with one hand, while the other is held to the breast, an electric spark may be obtained. As every chemical process is attended with alterations of the electrical condition of the bodies acted upon, we can easily understand how phenomena like this should occasionally occur. Two species of fishes, however—the gymnotus and the torpedo—are actually provided with an electrical apparatus, and are able to give very severe shocks. The gymnotus is found in the rivers of South America, and is an eel-like fish, from five to twenty feet in length: it discharges its electricity with such force as to kill small animals. Man sometimes has been rendered by it incapable of sense and motion, and horses are said to have been actually destroyed by it. The torpedo, inhabiting the Mediterranean and Atlantic, gives a less powerful shock; but the apparatus which produces it is similar to that of the gymnotus, and consists essentially of two large masses composed of a peculiar substance. Two or three other fishes are said to possess similar properties; but the use to which both they and the torpedo put them is quite unknown. Even the gymnotus eats very few of the animals which it kills.

CHAPTER XI.

DIGESTION.

THE processes of nutrition and excretion evidently presuppose the necessity of a constant supply both of solid and fluid matter to the blood; and we mentioned that it is a necessary condition, exacted by nature, that these supplies should consist, in a great measure, of previously organized matter, and that they should be acted upon by existing fluids, or assimilated, previously to their being applied to the blood.

The consequences of continued abstinence from food are at first wasting, and afterwards death. The length of time, however, in which food may be abstained from without the latter of these results, varies very much in different classes of animals, and in the same animals under different circumstances. The greater the activity and energy with which the vital actions are performed, the more necessary is the demand for a frequent supply of nutriment. We have an instance of this in the animals which hibernate. During their torpid state, their only sustenance is the fat which they have accumulated; in the summer, when they are active, unless they constantly eat they droop and perish. Children, too, in whom growth is going on, for the same reason bear abstinence worse than adults; and it often happens, in cases of starvation, that the youngest sinks first.* For a similar cause, the cold-blooded animals can live without food for a long time. Gold fish often live and thrive when confined in a glass vase, with no nutriment but the organic matter which all rain or spring water contains. It would appear, too, that the period of abstinence from food, depends, in many animals, upon the facility with which it is intended they shall obtain it. Thus, among the larva of insects, those which are intended to live upon dead matter surrounding them, speedily die if removed from their food; while those which are destined to feed upon living prey, the supply of which is uncertain, can endure abstinence for a considerable time. Hawk eagles, tigers, and other carnivorous animals, whose food is precarious, and to be sought, can live without food for a period, during which the herbivorous, such as the cow and deer, would die. Then the mole, a carnivorous animal, which lives upon insects and worms, but which yet can take but little at a time, has been known to expire from less than a day's abstinence. In the human species, fasting has been borne for forty days, and perhaps longer in cases where the vital functions were very languid; but many of the cases upon record of such extraordinary occurrences have doubtless been impostures. When fluid is also abstained from, death takes place in less than half the time.

The processes of the reception of food into the system, and its assimilation, are put under the control of two sensations—hunger and thirst, which, in the healthy state, are a true index to the immediate wants of the system; the food is then masticated and swallowed by voluntary but instinctive motions, and then passes into the realms of organic life. Hunger and thirst are dependent upon some state of the nerves of the stomach, which state is likewise probably connected with a particular state of contraction of the muscular fibre of that organ. Thirst is, indeed, referred to the back of the mouth; but, in cases where a preternatural opening has existed between the mouth and stomach (as

* In cases of shipwreck, &c., where two of a family perish from exposure and starvation, it is often of consequence to determine who died first. The probability always is, that the weaker did.

in cases of cut throat), it has been found that the thirst was not relieved by pouring fluid upon the back of the mouth, but that it was immediately so by introducing it at once into the stomach.

Before considering the nature of the various processes which take place in the act of digestion, it will be advantageous to consider the nature and sources of animal food.

The vegetable world affords food to many of the higher animals, and to many insects, while some others of the mammals subsist entirely upon the flesh of other animals. This latter is also the case with most of the fishes and reptiles. Man can exist upon either of these two sources of food, although his mind and body attain the greatest perfection upon a mixture of them. The relative proportion which is most useful depends upon circumstances, and varies according to the climate and habits. Man, too, always uses the art of cookery in the preparation of the greater part of his food, and there is no doubt that this enables us to dispense with various arrangements of our digestive organs, which would otherwise be requisite, so as to insure the proper digestion of many articles of our food.

The vegetable tissues essentially consist of carbon, oxygen, and hydrogen, and combined together in pretty nearly the same proportions as these elements are in sugar, or gum, or starch. Indeed, they may, by a simple chemical process, be converted into such. Hence the alimentary substances derived from the vegetable kingdom may be included in a group, to which the name of *saccharine* has been given. Some parts of vegetables, also, consist of an oily matter, which corresponds in constitution with the fat of animals, and which is composed of the same elements, but with a larger proportion of hydrogen and carbon. These form a distinct group of aliments, called *oleaginous*. Again, in animal tissues, and also in many vegetables, as in the gluten of wheat, we find another group, composed of four elements—carbon, oxygen, hydrogen, and nitrogen—and which is called the *albuminous* group. These three groups contain all the vegetable articles of food which are used by man, to keep up and renew the different animal tissues.*

It is evident that the higher animals cannot be kept alive, if fed only upon objects drawn from the oleaginous and saccharine groups. The experiment has been tried upon dogs, and they have uniformly died; and it was evident before their death that their tissues were decaying. This was attempted to be explained by the undoubted fact, that life cannot be maintained upon any one substance, however nutritious, nature demanding a certain variety. But when the dogs were fed upon a variety of non-nitrogenized substances, the same fatal result took place. Hence we may conclude, that life cannot be supported long without a sufficient supply of the aliments derived from the albuminous group,

* Albuminous articles of food likewise contain, but in small quantities, phosphorus, sulphur, iron, &c.

i. e. for all practical purposes, from the flesh of animals, and from the gluten, &c., of vegetables. And from what we have often had occasion to see of the presence of nitrogen in the animal tissues, and also in the secretions, we could, before this portion of our investigation, have foretold this. But still there is something not thoroughly understood about this matter, and some little degree of public attention was lately directed to it, upon the occasion of M. Soyer inventing the soups for the famishing Irish. As these contained little nitrogen, it was said of them that they would prove of little or no service. Notwithstanding all this, there is no doubt but that animals, and even man, have been supported, for a considerable time, upon articles of food which have not contained nitrogen. The black workmen in the West Indian islands, during the cultivation of sugar-cane, live almost entirely upon sugar, and actually grow fat upon it. The men employed to gather the gum from the acacia trees, in Arabia and Senegal, subsist, for a time, almost exclusively upon it; and the members of a caravan, who, in crossing the desert, exhausted their provisions, kept themselves alive by living upon some which formed part of their merchandise. Many of the Hindoo castes live entirely upon rice, which contains little nitrogen, and the poor Irish themselves upon potatoes, which are similarly constituted. The only rational explanation that can be given of these extraordinary facts is, that the nitrogen is obtained from some other source, probably from the air, either at the lungs, or at the skin. The amount of absorption by the skin is sometimes very extraordinary. It seems, too, to be influenced by previously taking a small quantity of stimulants. Dr. Watson states that a lad at Newmarket, who had been half starved in order that he might be reduced to the proper jockey weight, increased in weight, within an hour after taking half a glass of wine but nothing else, no less than thirty ounces. This must have been owing to absorption. We are certainly, however, notwithstanding these anomalies, or apparent anomalies, justified in saying that the body cannot be kept in life without a due supply of albuminous or nitrogenized matter.

In fact, the albuminous substances are, probably, alone destined to re-form the tissues, and the oleaginous and saccharine to be used in the purpose of respiration, or rather of animal heat, *i. e.* by supplying carbon and oxygen.

In addition to their necessary constituents, some of the objects of these three groups contain the various minerals which are necessary for the composition of the various tissues. These, however, along with the principal divisions of these groups, we shall consider when we come to speak of Dietetics.

It is a curious fact, that milk, which is the sole food of mammals for some time after their birth, is composed of articles derived from each of these groups. The casein which forms its curd is albuminous, its butter is oleaginous, while its whey contains a quantity of sugar.

It is always very important to remember, that a great degree of variety is

found among individuals with regard to the kind of food which is easy of digestion, and that much of this is the effect of habit. Many substances, at first nauseous and indigestible, become in time agreeable and easy of digestion.

Digestion is naturally divided, among the higher animals at least, into the mechanical division of the food, which is generally effected by means of teeth, or mastication; the blending of the saliva with it, or insalivation; the conveying it from the mouth into the stomach, or deglutition; the vital action which is carried on with it there, and which is called chymification; its passage into the intestines, where it separates into chyle and innutritious matter, or chylification; and into the mixture with, and conversion of this chyle into blood. Each of these will demand a short explanation.

The teeth are so implanted in the jaws as to act against one another with a cutting or crushing power, according to the nature of the food upon which they have to operate. They consist of ivory, which constitutes their body, and a still harder substance, which, in man, forms their crown enamel. Their chemical constitution is principally phosphate of lime, and carbonate of lime. The enamel is the hardest substance formed in the body, and does not contain two per cent. of animal matter. The interior of each tooth is hollow, and contains a little membrane, which is supplied with a small artery and nerve, and is the seat of pain in toothache, the tooth itself being perfectly inanimate. In man, and indeed in most of the mammalia, three different kinds of teeth are found, adapted for the various purposes of cutting, holding, and grinding. They are represented in Plate IX., fig. 27. The incisors terminate in a thin cutting edge, and serve to divide the food. In man they are four in number in each jaw, those in the upper one, particularly the central pair, being the larger. Their roots are all single, elongated, and tapering. The canine (in man, two in each jaw) have a more conical form, and, in some animals, generally those of carnivorous animals, they project far beyond the former, and their object is probably to obtain a firmer grasp of their prey. They are also useful in tearing asunder the food. Their roots are single, but penetrate the jaw deeply. The other remaining teeth are called the molars, and are divided into the bicuspidate, or small molars, and the large molars. They have a large irregular flattened surface, and their intention is to grind the food. The former mentioned are, in man, four in number in each jaw, and have two tubercles upon the cutting surface; while the molars, six in each jaw, have four. The roots of the small molars are sometimes single, and sometimes double; while those of the large ones have two, three, or even four roots, or fangs. This evidently gives great firmness to them.

The teeth are not formed at birth, or, at least, not developed. They make their appearance above the gum about the time when the infant ceases sucking. The teeth are not even then permanently formed, but a set, termed the milk

Fig. 27.

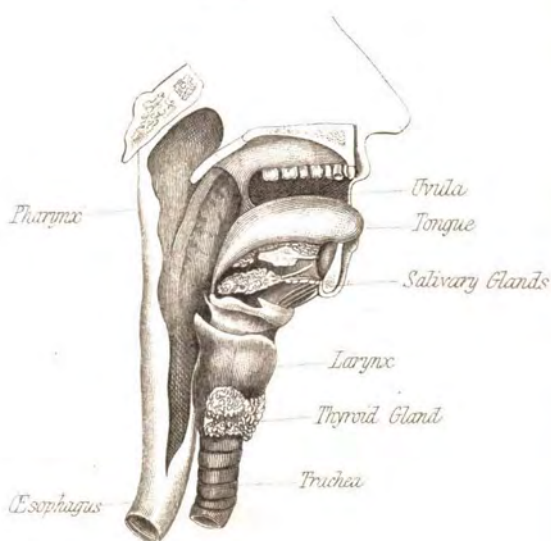


Fig. 28.



MOLAR TEETH OF HERBIVOROUS ANIMALS

Fig. 29.



THROAT AND GULLET

Fig. 30.

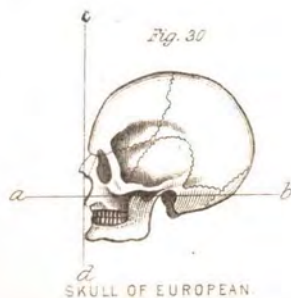


Fig. 31.



set, of but twenty in number, and which fall out, and are replaced by the ones we have described about the seventh year. The molars farthest back, however, are some time before they make their appearance, and are hence called the wisdom teeth.

A very curious arrangement is found in the molar teeth of herbivorous animals. Fig. 28, Plate IX., represents some of them. The enamel, instead of being placed at the crown, and thus covering the top of the tooth, as in man, is dispersed in upright layers throughout the tooth. The consequences of this beautiful arrangement are obvious: the softer matter of the ivory wears away faster than the enamel, leaving it therefore a little projecting, and hence forming so many cutting edges, or rather grinding edges.

A few of the mammalia have no teeth. The ant-eater is one of these. It is provided instead with a long tongue, which is covered with a viscid matter; this is thrust into an ant-hill, and the ants adhere to it. The whale, too, has no teeth. The whalebone serves in this animal for the apprehension of food, and it is so constructed as to form a sort of sieve, through which water is drawn, and the little insects, upon which the whale lives, are strained out. Birds have no teeth. Fishes and reptiles are usually furnished with many, but their use is not for masticating so much as for securing their food.

The act of mastication is accomplished in man by moving the lower jaw both from before backwards, and from side to side. It is, of course, effected by the muscles of the head and face. Although performed instinctively, it is entirely under the control of the will.

The sensations produced by the presence of agreeable food in the mouth, cause a flow of saliva, which, in the process of mastication, is mixed most intimately with the food. The saliva consists almost entirely of water. The proportion of animal and saline matter (principally common salt) is not one per cent. It is secreted by three glands—the parotid, situated in the angle between the lower jaw and the ear, and two smaller ones placed under the tongue. They are seen in fig. 29, Plate IX. The use of insalivation is purely mechanical, and prepares the food for the action of the stomach.

The food, triturated and moistened, is now prepared for the act of deglutition. The diagram (fig. 29) will give an idea of the anatomy of the parts concerned. It represents a section of the mouth and throat. The mouth is guarded behind by a moveable curtain, called the soft palate, and terminating in the little hanging piece of membrane which can be seen in the throat, and which is called the uvula. During mastication this hangs down, and prevents any of the food passing, at this period, into the expansion of the oesophagus, termed the pharynx, which, it will be observed, besides communicating with the mouth, also does with the windpipe, and with the cavity of the nostrils. The food is carried by the tongue backwards, and, by a voluntary act, we raise

the uvula, and then the food passes into the lower part of the pharynx, and from this into the œsophagus, where its movements cease to be under the control of the will. As, in order to reach this tube, it must pass over the orifice of the larynx, this organ is, by the act of swallowing, pressed underneath the base of the tongue, and by this action a little valve-like body, called the epiglottis, is made to cover it. If, notwithstanding such precautions, a drop of fluid, or any of the contents of the pharynx, should enter it, we saw before how, by the reflex function, the larynx was thrown into convulsions, the object of which is to expel the foreign body.

The œsophagus consists of a tube of mucous membrane, surrounded by muscular fibre. As the food passes into each portion, that portion contracts, and continues contracted until the portion next to it has contracted likewise. By this means the food is gradually propelled into the stomach. This contraction of the fibres of the œsophagus is entirely independent of the will, and is caused by the food acting as a stimulant upon the muscular fibres.

The sensations of hunger and thirst abate when the aliment reaches the stomach. Other and more agreeable sensations succeed to them, which are doubtless dependent upon the pneumogastric nerves, inasmuch as animals, when these nerves are divided, seem not to be aware of the condition of their stomachs, but go on eating long after that organ has been distended.

The stomach is a large membranous bag, formed, like all the intestinal viscera, of three coats—an inner or mucous, a muscular, and an outer or serous. The aperture where the œsophagus enters, is called the cardiac orifice, while the other one is termed the pyloric. Its left side will be seen in the engraving (Plate X., fig. 30) to bulge out a little. This bulging is not found in the stomachs of the purely carnivorous animals, but is much larger in those of the herbivorous than in that of man. In this respect, as well as in the construction of the teeth, it is evidently intended by nature that man should be an omnivorous animal. A little to the left of the stomach is situated the spleen, an organ consisting of many cells, and whose probable use is to act as a reservoir of the superfluous blood of the stomach. Behind the stomach is the pancreas, or sweetbread, which secretes a fluid similar in its nature to that of the salivary glands, the purpose of which is probably the same. The first portion of the small intestines is called the duodenum, into which the pancreas, as well as the contents of the gall bladder, are poured. In glancing at the liver, it will be observed that it is divided into two lobes, having placed upon its right one the gall bladder. The intestines are composed of three coats, like the stomach and œsophagus, and contract in the same manner upon their contents. We may observe, that section of the nerves which supply them has no effect upon their contractions. The only other point which calls for our attention in the structure of the intestines is the little appendix of the cœcum, seen upon the

Fig. 30.

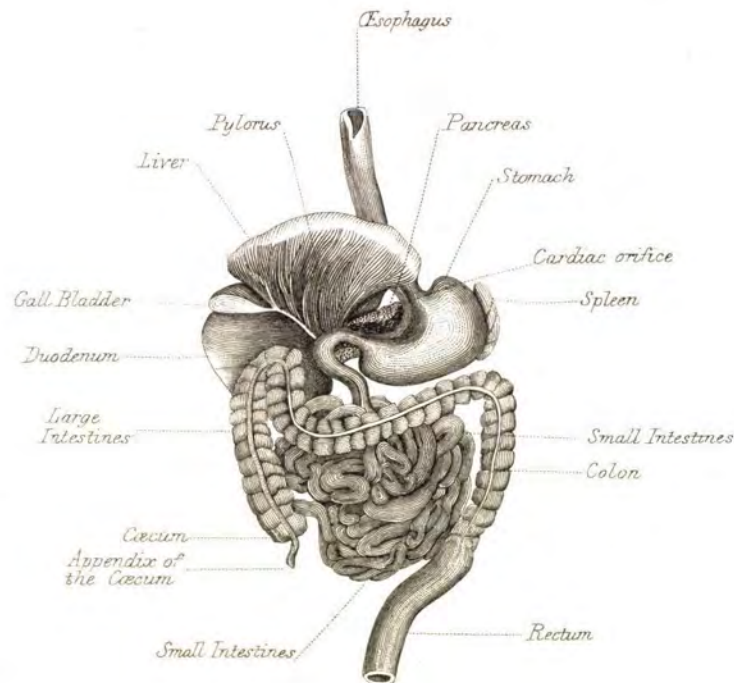
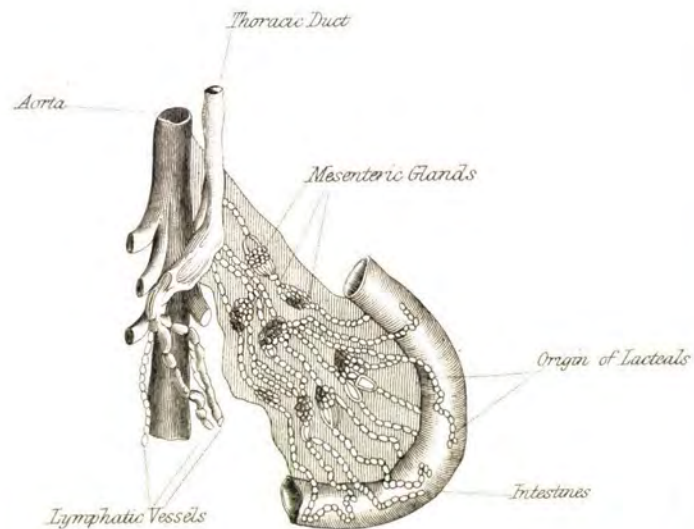


Fig. 31.



right side. This is very small in man, but in herbivorous animals it is much larger, and acts as a second stomach.

Upon examining a stomach an hour or two after food has been taken, we find that the contents of the pyloric end have undergone a complete change, and that the layers nearest the outside, in the other parts of the stomach, more or less resemble it, while the contents of the inside are less changed. The reason of this would seem to be, that the portions of the food which are acted upon by the mucous membrane are pushed on towards the pylorus, while fresh portions from the interior take their place. In process of time, the whole mass is more or less completely converted into a homogeneous greyish substance, to which the name of chyme is given.

The chief agent in this conversion is the gastric juice, a fluid secreted by the stomach, when its mucous membrane comes in contact with food. In appearance this is very like saliva, but it is distinctly acid to the taste: this acidity is owing to muriatic and acetic acids. It contains, moreover, a peculiar animal principle, to which the name of pepsin has been given, to which, and to the acid, it is supposed the gastric juice is indebted for its solvent powers over the contents of the stomach. The acid probably dissolves the food, and the pepsin acts in such a way upon it as to convert it into chyme.

Dr. Beaumont, an American physician, had a very curious and favourable opportunity of observing the changes which take place in the stomach. A patient of his received a wound in the side, which made a hole from the outside to the stomach. The man perfectly recovered his health, but the hole did not heal up, and he was obliged to wear a bandage to cover up the aperture. Gastric juice, taken from this person's stomach, was found to possess, at a temperature of a hundred degrees, the power of dissolving food out of the stomach, although the process occupied longer.

The chyme is pushed forward by the contractions of the stomach into the duodenum, where it is mixed with the bile and the pancreatic juice. Its acidity now gradually disappears. By the contractions of the successive portions of the intestines, it is steadily propelled along. During this course, it separates by degrees into chyle, which is absorbed by the lacteals; and into the innutritious and indigestible matter, which is carried onward along the intestinal canal.

We had, in the chapter upon ABSORPTION, occasion to allude to the lacteals. They arise from the mucous membrane of the intestines, unite into minute trunks, then again into larger ones, pass through the mesenteric glands (see Plate X., fig. 31), and terminate into the thoracic duct, where also, as our readers will remember, do the lymphatics. This thoracic duct empties its contents into the circulating system at the junction of the subclavian and jugular veins. The lymphatics of the upper extremity pour their contents, by

a separate duct, into the circulating system, at the junction of the right sub-clavian and jugular veins.

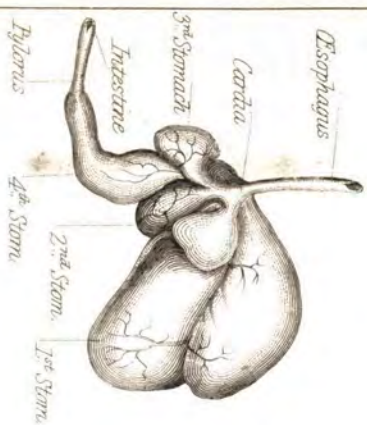
The chyle is to be regarded as blood in an early stage of formation. The analysis of some, taken from the thoracic duct of a dog fed upon animal food, gave, in a hundred parts, not quite one per cent. of fibrine, about nine of albumen, some salts, and the remainder was water. As it is mixed with the blood just before its entrance into the lungs, and as it never can be recognized after the blood has passed thence, it is probable that it undergoes some vital change here which completes its assimilation, but of the nature of this change we are ignorant.

It is always important to bear in mind, that the whole process of digestion, although perfectly uninfluenced by any voluntary act of the mind, yet it is materially affected by mental emotions and the sensations, and that the secretion of gastric juice by the stomach is particularly so.

The digestive apparatus of the animals which chew the cud, and of birds, possess such curious peculiarities, that we will conclude this chapter with a brief allusion to them.

Fig. 32, Plate XI., represents the stomachs (for all the ruminating animals have four) of a sheep, and fig. 33, Plate XI., a section of the same. All the animals which chew the cud do not chew their food before they swallow it. The intention of this would seem to be to allow them, in a state of nature, to be as little exposed as possible to the attacks of carnivorous animals, inasmuch as they can swallow their food as fast as they can crop it, and retire to a place of safety to masticate it. The crude unmasticated *solid* food passes down the œsophagus, and enters the cavity upon the left side, which is called the first stomach, or paunch; it is here mixed with mucous fluid, and transmitted to the second cavity, or honeycomb. Fluid passes directly from the œsophagus into this cavity without entering the paunch at all. It is here that in the camel is found the curious arrangement of cells, which enables this animal to retain a supply of water for several days. They only differ from those found in other ruminating animals in being deeper, and in having a network of muscular fibres which can close their orifices. From the second stomach, the food is returned, at the animal's leisure, to the mouth, for the purpose of mastication and insalivation. When the food has undergone this process, it is again swallowed, and, by a peculiar valvular groove at the bottom of the œsophagus, is directed into the third stomach, or monyplies, from which it passes to the fourth, or real stomach, which is popularly termed the reed. Here it is that the gastric fluid is secreted, and here, of course, that the true digestion takes place. From it the rennet is obtained by the cheesemaker. It is obvious that this system will not apply at all well to the calf, as long as it is living upon milk; and curious enough, in this stage of life, the milk passes at once into the third stomach.

Fig. 32.



STOMACH OF A SHEEP.

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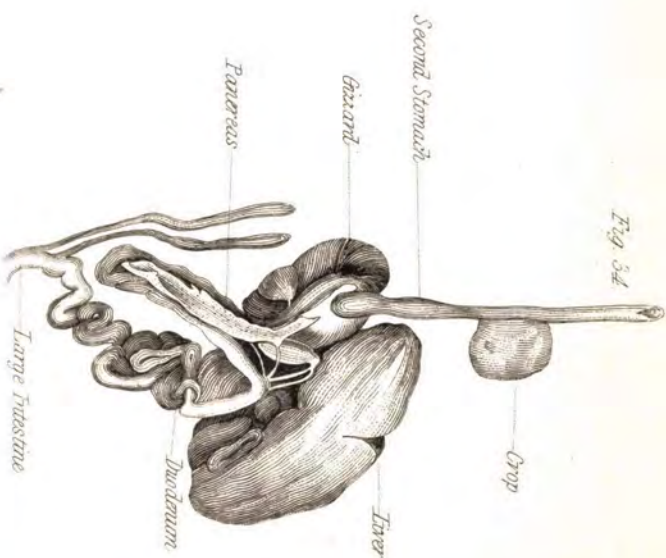
Fig. 33.



SECTION OF A SHEEP'S STOMACH.

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Fig. 34.



DIGESTIVE APPARATUS OF A FOWL.

P. 69

Fig. 34, Plate XI., represents the digestive apparatus of a fowl. Birds, as we mentioned, have nothing in their mouths corresponding to teeth; and hence some provision is necessary for reducing their food. Those birds who live upon grain, or granivorous ones, have, upon the œsophagus, a pouch-like cavity, called the crop, where the food taken in is first lodged, and where it is mixed with a fluid which will have the tendency to soften it. The second stomach secretes the gastric juice, but is seldom large enough to retain the food, which passes on to the third stomach, or gizzard. This is a hollow muscle with a hard tendinous lining, which, by its contractions, chews, if we may be allowed the term, the food. The granivorous birds swallow pieces of gravel, which being worked up with the corn, by the action of the gizzard, assist in its reduction. Various experiments have been made to test the powers of this masticating organ, and they have been found to be enormous. Balls of glass, given to birds, are ground to powder, and needles, fixed in a ball of lead and swallowed, were blunted and broken off, without the internal coat of the gizzard being at all injured.

CHAPTER XII.

THE EXTERNAL SENSES.

WE have now considered all those functions which are concerned in preserving in integrity the animal frame, and we now proceed to the investigation of the strictly animal functions which are connected with the nervous system, and which essentially characterize the animal kingdom.

All animals possess a greater or less amount of *sensibility* to the condition of things external to them. A sensation is that change in the mind which takes place in consequence of an impression upon an organ of sense. This organ of sense always contains the termination of nerves; and it is an essential condition to sensation, that the communication between such and the base of the brain be uninterrupted. Besides this, the presence of arterial blood in the parts concerned is necessary. As the nerves of sense, when both these conditions are fulfilled, are sometimes unfit for their office, then other, although unknown, conditions of the nervous system must be necessary.

The lower animals probably possess only common sensation, as it is termed; that is, the one by means of which we feel the impressions of foreign bodies around us, or of actions taking place within us, and which produce the sense of contact or touch, that of pain, itching, cold and heat, &c. But man, and the

higher animals, possess, in addition, special senses, which are felt only in consequence of impressions made upon special organs, and which include taste, hearing, sight, and smell. We commence our account of these with—

COMMON SENSATION.

The simplest form of this is called touch, and is produced when any external substance comes in apposition with most parts of the body. These parts are said to be endowed with common sensibility, and from mechanical irritation, carried to a certain length so as to press upon sensitive nerves, the sensation becomes *pain*.* Pain is excited by other causes, the nature of which is quite unknown. In many textures the sensibility is slight, as in the bones, tendons, &c.; but when inflamed, these become the seat of acute sensation. The internal parts of the viscera have less sensibility than their coverings, and the brain, and the nerves of the spinal senses, are supposed to be almost entirely destitute of it. The non-vascular parts, as the cuticle, nails, &c., are absolutely insensible.

Common sensibility is the most marked in the skin and mucous membrane, and especially in the tips of the fingers, and in the tongue. Along with pain in violent disease or injury of the abdominal viscera, and of other parts, is associated the idea of nausea and faintness.

The sensation of heat or cold is of a comparative, more than of a positive kind. We estimate the heat or coldness of a foreign body by comparing it with the temperature of ourselves. Thus, of two people, one ascending, the other descending, a high mountain, the former feels the atmosphere to be warm, and the latter cold. If we plunge one of our hands into cold water, and the other into hot, and then transfer them both into tepid water, the tepid water feels hot to the one hand, and cold to the other. It is a curious fact, that a much greater degree of heat can be borne by a small surface, than a less degree by a large one; thus, the finger can be held in hot water without inconvenience, when the whole hand cannot be borne to be kept in water not nearly so warm.

The only idea presented to our minds by the sense of touch, when this is exercised in its simplest form, is that of resistance, and by it we may acquire an idea of the hardness and softness of the body which we touch. To attain a knowledge of its size and shape, it is necessary that we should place our fingers, or whatever part of the body we will, upon it, and attend to the muscular movements we execute. This acuteness of touch is capable of being very much improved by education and habit. Many extraordinary instances of this have occurred, especially among blind people.

* We refer to the pains experienced in hysterical diseases, &c.

Although the parts most endowed with fineness of touch are in man the fingers, in the other animals various other organs are selected. In the bat, the power of touch seems to be given to the whole membrane of the wings in a most extraordinary degree. In the very cruel experiments, where bats were not only blinded, but, as far as possible, deprived of hearing and smelling, they flew about with as much precision as before, avoiding obstacles, even small threads purposely put in their path, and threading their way through passages just large enough to admit them, and flying, with perfect ease, through places completely unknown to them. The peculiar habits of this bird, doubtless, render necessary great cultivation of this sense.

We treat, at the same time, of—

SMELL AND TASTE,

because the latter would seem to be a mixture of the former and touch. In order that the sensation of smell may be felt, it is necessary that air, impregnated with certain effluvia, pass along the mucous membrane lining the nose, upon which the first or olfactory nerve terminates. The highest part of the nasal cavity appears to possess the strongest sensibility, and hence, when we *snuff* the air, so as to direct it to the upper parts of the nose, we perceive odours which were before not appreciable. Many animals possess this sense in far greater perfection than man. In the deer, and analogous tribes, it is so delicate as to enable them to scent the approach of the hunter at a great distance; and the only plan by which he can succeed in reaching them, is to approach in the quarter contrary to that from whence the wind blows. Some of the carnivora, especially the dog, have this sense highly developed. The intention for which it is communicated to them is not, as every one knows, that they may avoid their pursuers, but to enable them to follow their prey.

The sense of taste is described to be that which results from the contact of certain substances, termed *sapid*, upon the tongue, gums, and palate. It is, however, dependent on common sensation, along with that of smell produced by the odour arising from them. When, as in a common cold, smell is absent, the flavour even of bitter or sweet things is not perceived; and, indeed, by expiring while a *sapid* substance is held in the mouth, its taste is only felt the moment we inspire, so as to allow the effluvia to ascend to the nostrils.

The uses of taste, besides its being a source of enjoyment, are to excite the flow of the saliva and mucus which are to prepare the food for the stomach, and to inform us of qualities in the objects which excite it, which bear a certain relation to their salubrity and digestibility. This latter use is better exemplified in animals than in the human species, although in man, during sickness, it is generally a very safe guide.

SIGHT.

By means of this sense we not only are aware of the presence of light, but through it as a medium we take cognizance of the size, colour, position, and form of surrounding bodies.

With regard to the nature of light, two opinions are held by opticians. The one is, that its rays are composed of actual particles which radiate from luminous bodies; the other supposes the existence of a very subtle fluid, or ether, which extends over all space, and that the light consists in undulations or vibrations of it. The latter is probably the true theory; but the discussion of the merits of the two is uninteresting to the physiologist, inasmuch as the laws concerning the transmission of light are the same under both systems, and, moreover, are fortunately well understood. Some of these it is necessary to allude to.

When light passes through any single transparent body, as air or water, it always passes in straight lines; but when it passes from one transparent body to another, as from air to water for instance (except, indeed, when it falls perpendicularly upon the surfaces where they join), it undergoes a change of direction, or, to use the technical expression, is refracted. A familiar instance of this is seen by putting a cedar pencil into a tumbler of water, when, owing to this law, the part of the pencil under water will seem to form an angle with the part remaining above.

The degree of refraction varies in different bodies. We judge of it by supposing a perpendicular to be drawn to the surface of junction of the two transparent bodies, at the point where the ray of light quits the one and enters the other, and we observe whether its change of direction, in its course through the second body, be towards or from that perpendicular. If it be refracted towards the perpendicular, we say that the substance which it enters has the greater refractive power of the two. We find that, generally speaking, dense bodies have a greater refractive power than those which are rarer, as water or glass for instance, than air.

When the surface which separates the two media is not flat, but either convex or concave, the direction of the rays of light which fall upon it is altered. Thus, in Plate XII., fig. 35, *b b* is a convex piece of glass, and *a* is a luminous body, from which three rays are issuing. The central one, *a c*, falls upon the glass in a perpendicular direction to its surface at that point, and therefore passes on unchanged. But the ray, *a d*, on entering the surface, will be bent towards *e*, which is perpendicular to the surface of the lens at the point where *a d* enters; therefore, as glass has a greater refractive power than air, *a b* will pass on in the direction, *f*: in like manner, *a g* will be directed towards *i*. It is evident that, if these rays were prolonged, they would meet each other. The point of meeting is termed the focus.

On the other hand, the reverse would take place if the rays passed from a denser medium into one more rare. It is thus evident, that when a ray of light, passing through air, falls on a convex lens of glass (*i. e.* a piece of glass bounded upon each side by a segment of a sphere), or any other transparent medium denser than air, it will undergo two refractions—one when it enters the lens, and the other when it passes out; and it is farther obvious, that each refraction will bring it nearer to the axis of the lens.

If different rays, proceeding from the same object, pass through air, and fall upon a convex lens, the result of these two refractions will be to concentrate all these rays into a focus beyond the lens.

As a convex lens concentrates all the rays from a distant *point* into a focus, so it concentrates all the rays from a distant *object* into an *image*.

Now, the eye is essentially a convex lens, by means of which the rays of light, proceeding from an object, are concentrated behind it into an image, which being placed upon the termination of the optic nerve, produces in the brain the sensation of sight. Nothing, perhaps, in nature presents so many beautiful contrivances for effecting this purpose as the eye does; and vision has always been considered to afford some of the best illustrations of Natural Theology.

The eye, or eyeball, situated deep in the orbit, is protected in front by the eyebrows and eyelids, and its surface is kept constantly moist by means of the secretion of the lachrymal gland, placed upon the outer side of the eye. The secretion from this is always oozing, and, passing over the eye, is carried into the nose, through the little canal, the orifice of which is seen in the inner corner of the orbit. Mental emotion causes great increase of this secretion.

The eyeball is nearly spherical. It consists of membranes placed one within the other, and humours, or fluids, which these membranes contain. It is connected with the eyebrows by means of the conjunctiva, a mucous membrane, which, lining them, is reflected over the anterior part of the eyeball. The fig. 36, Plate XII., represents a section of the globe of the eye, &c. The sclerotic coat, or membrane, No. 1, is a firm fibrous membrane, and forms about four-fifths of the external investment of the eye. Posteriorly, it is penetrated by the optic nerve, 17. In front it is joined by the transparent cornea, 3, which is received within it after the fashion of a watchglass: this is seen at 2. Just at the point of junction is a ring of light grey matter, 4, called the ciliary ligament. The choroid membrane, 5, lies underneath the sclerotic, and is essentially a vascular structure, and terminates anteriorly in sixty or eighty little processes, called ciliary, 6. Underneath the choroid membrane is seen the retina, 7, which is nothing but the expanded termination of the optic nerve. Upon looking through the cornea, we behold a coloured circle: this is the iris, 8. This structure is muscular, and is perforated in the centre by an aper-

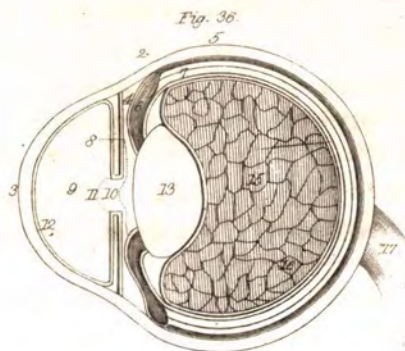
ture well known by the name of pupil. By the contraction of the fibres of the iris, the size of the pupil can be changed, and is so changed according to the intensity of the light—being larger when there is little, and smaller when there is much glare. Of course this is done independently of our will. The iris is suspended in a cavity, bounded in front by the cornea, and behind by the crystalline lens, 13. This is occupied by the aqueous humour. The space between the iris and the cornea is termed the anterior, 9, and that between the iris and the lens, the posterior chamber, 10. To speak exactly, the aqueous humour is in the anterior chamber, surrounded by a very thin membrane, 12, which secretes it. The lens is doubly convex, and perfectly transparent. Behind it is the vitreous humour, 15, which fills up the posterior two-thirds of the eye. It is surrounded by a thin membrane, which also forms a number of processes, projecting inwards, and dividing it into detached masses, 16, 16. Both the humours of the eye are almost entirely composed of water, containing only about 2 per cent. of animal and saline matter, while the lens contains 42 per cent.

The muscles of the eyeball are six in number, and, with one exception, originate at the back of the orbit, and are inserted into the sclerotic coat. These perform all the motions of the eye; and it is when one or more of them is contracted, that we have that form of squinting which can be relieved by an operation. The different motor nerves, arising from the brain and entering the eyeball, supply these muscles.

When the eye is turned towards any luminous body, whether it evolves light itself, as the sun, or reflects light, as almost all visible bodies do, the following phenomena take place. The ray of light which falls perpendicularly upon the centre of the cornea undergoes no refraction, but passes on through the transparent humours and lens to the retina. All other rays coming from the same object are refracted—first, when they enter the cornea and aqueous humour; then when they enter the lens, which has the greatest density and refractive power; and, lastly, when they pass from the lens to the vitreous humour. All these refractions are toward the axis of the eye, and hence all the rays meet about the same point of the retina where the ray which fell perpendicularly upon the cornea did. As before stated, as the rays from a point form a focus, so do those from an object, or set of objects, form an image or picture upon the retina, which gives us the sensation which we call sight.

A little consideration will show that this image upon the retina must be inverted, or upside down. Plate XII., fig. 37, represents two rays* issuing, one from each extremity of an arrow. These rays cross each other in the middle of the eye; those from *a* are brought to a focus at *b*, and those from *c* to one at *d*. In fact, if we examine the eye of an animal recently killed (for the coats and

* We only give two to render the diagram clearer; but, of course, rays would proceed from all parts of the object.



SECTION OF HUMAN EYE



CURED ECTROPIUM.



ECTROPIUM.

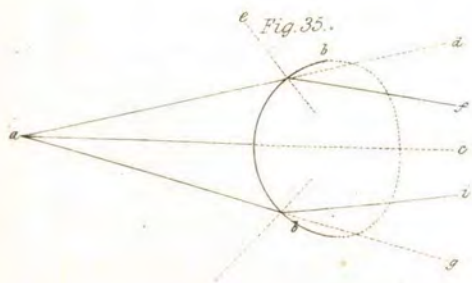


DIAGRAM OF VISION

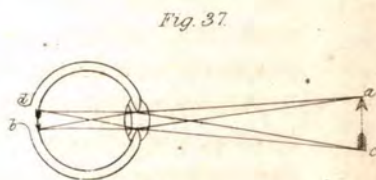
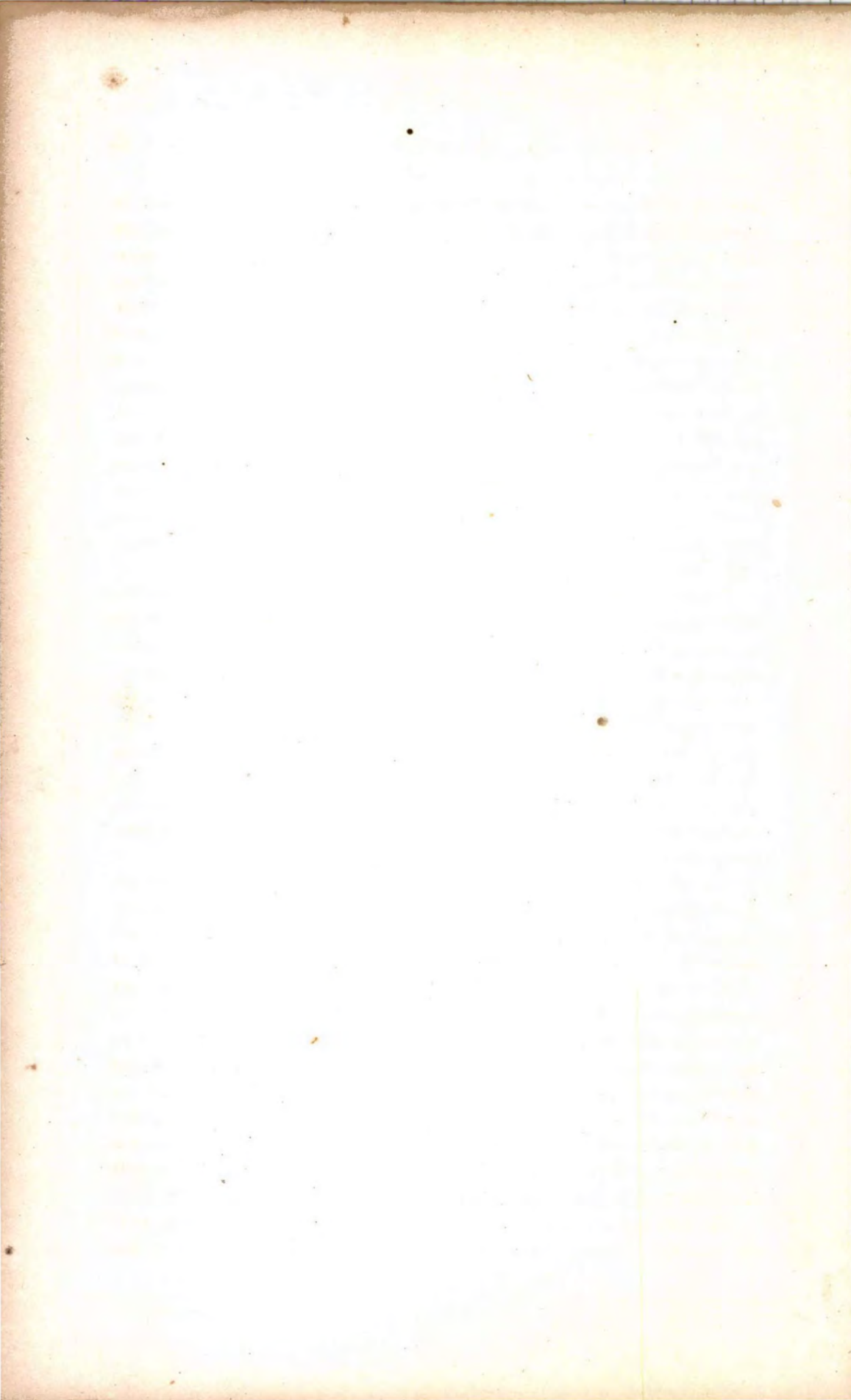


DIAGRAM OF VISION



humours of the eye soon lose their transparency after death), the image can be seen upon the retina in the position we describe it. It is not easy to explain how it happens that we see the objects erect. It is not that the infant at first really sees everything the wrong way up, and learns his error by inference; inasmuch as in people, who, having been born blind, have obtained their vision at a mature age from an operation, no such thing has been felt, but they at once see objects erect. Some peculiar nervous arrangement, into which it is impossible to enter here, is probably the true explanation of this circumstance.

After looking for some time at a distant object, or one strongly illuminated, it is difficult for a few moments to perceive a near darker one. In a very short time, however, the eye adjusts itself, and it has the power of receiving distinct impressions from objects situated at different distances. This adjusting power of the eye is probably dependent upon some change which takes place upon either the proportion or form of the lens, by which means it is either placed nearer the retina, or its refractive power is diminished.

The causes of short and long-sightedness, and of most forms of blindness, will now be obvious. If the lens, or any of the refractive parts of the eye, be too convex, the rays of light which enter it are brought to a focus too soon, and before they reach the retina. This is near-sightedness, and is relieved by placing a concave lens between the object and the eye, by means of which the refractive power is diminished. If, on the other hand, the cornea is not sufficiently convex, and the humours not sufficiently refractive, the image is not completely and clearly formed upon the retina. This is long-sightedness, and is relieved by the use of a convex glass. If, again, the cornea or the lens be rendered dull by disease—if the pupil cannot expand, or if the retina be paralyzed, of course imperfect vision, or utter loss of vision, is found.

We have, in the above observations, considered vision as occurring in one eye merely; but in fact, as every one is aware, both eyes are in general employed, and yet but one object is seen, although there is no doubt that two images are formed, one upon the retina of each eye. This seems to be the effect of habit, as, when the images fall upon parts of the retina which are not accustomed to act together, double vision actually occurs. Thus, if we look at an object with both eyes, we behold it as one object quite correctly; but if we press with our finger one eye a little sideways, so as to make its axis different from the axis of the other one, two objects are immediately perceived. If squinting come on suddenly, there is for a few days double vision, until the habit of seeing one object only has been formed; and if the squinting be suddenly removed, there is again double vision for a little time, although the parts of the two retinas which formerly acted together now do so again.

The different sensations excited by the images upon the retina in the adult state, certainly not only inform us as to light and colour, but also as to the

distance, position, and size of objects. It may be doubted if these latter are not acquired perceptions of sight, *i.e.*, acquired by experience, and by the aid of the sense of touch. In the instances of persons born blind, and whose sight has been obtained by an operation, these latter notions of the properties of objects, suggested by their newly-acquired sense, were very vague and imperfect. On the other hand, some of the lower animals, the moment they come into the world, form accurate and correct judgments of the position and distance of surrounding objects.

The eye is supplied with common sensibility by the fifth pair of nerves. Should these become paralyzed, the sensations produced by the want of the tears and mucus not being perceived, these secretions are not poured forth, and fatal ulceration from want of them is the consequence.

Man by no means possesses the most acute powers of vision of all animals. Some of the birds of prey, perhaps, enjoy this privilege. On the other hand, some animals scarcely possess any eyes or powers of vision at all. The mole, which spends all its days in burrowing under the ground, is an example of this. Some of the articulate animals have an extraordinary complexity of visual apparatus. The large black body, for instance, seen upon the sides of the head of insects, consists of an immense number of eyes, amounting, in the house fly, to four thousand, and in a butterfly more than four times that number have been counted. Besides these, they are furnished with several other eyes, placed solitarily.

HEARING.

Sound is produced by the vibration of bodies in the air, and in almost every animal there is an especial sense, by means of which it becomes acquainted with such. In the lower animals, all that is necessary for this purpose is a short sac containing fluid, and lodging the extremity of the auditory nerve. But in man, and in the higher animals, very complex provisions and contrivances are found. As the exact uses of them are not perfectly understood, we shall only very rapidly run through them.

Plate XIII., fig. 38, represents the human ear, in which *a* is the cartilage, or external ear; *b*, is the auditory tube, which is always lubricated by an oily secretion—cerumen or wax; *c*, is the tympanum, or drum of the ear; *d*, is the cavity of the tympanum, kept filled with air by means of the Eustachian tube, *e*, which comes from the back of the mouth. It is owing to slight congestion of this, that in a common cold we experience a little deafness. At *f* is seen a chain of four little bones; at *g*, a cavity, called the vestibule; at *h*, three canals, called the semicircular canals; and at *i*, the cochlea. The vestibule is filled with fluid, and the membrane lining it is supplied with the terminations of the auditory nerve.



Fig. 3.



CARTILAGES OF LARYNX.

Fig. 6.



PTERYGIUM.

Fig. 4.



NEBULA

Fig. 5.



LACHRYMAL PARTS OF EYE



Sounds, besides differing in loudness or intensity, which depends upon the length of the vibrations of the body from which the sound proceeds, also vary in tone and timbre. Tone depends upon the number of vibrations which take place in a given time. The lowest note given by any musical instrument has sixteen vibrations in a second, and is the lowest C of the piano. The highest has 16,384, and is the highest note, F; but it is possible that some people can discriminate notes even higher. The timbre of sound depends upon the nature of the sounding body, and varies in every different musical instrument, although the note is the same. The cause of this is perfectly unknown.

Some people, who probably articulate during inspiration, have the power of producing sounds which have the same tone as those used in ordinary conversation, but which are more faint, and therefore appear to us to proceed from a greater distance than they really do. Upon this power, and a little artifice in misleading the imagination, essentially depends the art of the ventriloquist.

Deafness in man depends upon several causes. Hardened wax in the air passages produces it; so does closure of the Eustachian tube; likewise separation and discharge of the small bones, brought on by inflammation, often, as we shall afterwards see, of the scrofulous kind, and, as might be expected, disease of the auditory nerve. It is also sometimes found when none of these conditions, and indeed no unusual condition that we can appreciate, is present.

Before leaving the consideration of the external senses, it is proper to devote a little space to those cases, where causes within the body produce similar sensations to those which external bodies produce upon the senses. Pain is often referred to one part of the body, when we know that it is produced by an impression made upon another part. In one class of cases of this kind, the sensation is referred to the end of a nerve, whereas the cause is applied to the brain or the spinal cord. Thus, we have singing in the ears in affections of the brain, pain or tightness across the chest from disease of the spinal cord, and many other similar instances might be brought forward. Again, pain is often distinctly referred to one part of the body, when the cause is applied to another part—not the brain or spinal cord. Disease of the liver produces pain in the right shoulder; of the heart, pain in the left arm; irritation of the bowels, as in cholera, brings on spasms in the legs; irritation in the stomach, headache; harsh sounds set the teeth on edge; and many other similar occurrences happen in disease. They are called sympathetic sensations, and may, in some cases, be explained by connections of the sentient nerves of the two parts; but in others, this explanation is out of the question.

Another very curious set of facts must be referred to, viz., sensations produced by causes within the body, exactly resembling those produced by external impressions. We allude to supernatural sounds and spectral appearances. These are often exact representations of definite and complex impressions upon

the higher senses, certainly not the product of the imagination, and which, like real appearances and sounds, are perfectly beyond the control of any voluntary mental effort. The most striking illustrations of these are found in persons, either under the influence of opium or strong liquors, or having recently recovered from the effect of them; but they occur independently of any such causes in persons of a nervous temperament, particularly when they are under the influence of strong mental excitement.

To something of this nature may probably be referred the little that is true of animal magnetism and clairvoyance.

CHAPTER XIII.

THE CONNECTION BETWEEN THE MIND AND THE BRAIN.

THERE is no doubt that the nervous matters contained within the skull are the instruments by which different mental operations are executed, and as we find the size and development of the cerebral hemispheres are in man, and the different classes of animals lower in the scale, proportionate to the amount of intelligence shown, we infer that these are the especial parts of the nervous system in which the mind, as it were, resides. As we might expect, injuries and diseases of these parts generally impair the exhibition of mental phenomena, although large portions of them have been diseased, and even destroyed by disease, without any perceptible alteration of the intellectual powers.

Since the time of Gall and Spurzheim, many people have thought that they could appropriate different portions of the brain to the exercise of faculties, or particular subjects and classes of objects; and the particular science which has for its purpose the investigation of these is called Phrenology.

But there is little doubt that the gentlemen who have attended to such pursuits, although it is impossible to deny that many of them are men of undoubted talent, have overlooked many vital objections to their theory. We may mention the very varying results given, in different instances, by different competent observers; the source of fallacy which exists in the inference of the form and the size of many portions of the brain from mere inspection of the skull; and the condemning evidence which observations upon cases of diseased brains have brought forward.

In the different races of mankind, and in the different classes of the vertebrate animals, the size of the cerebral lobes can be ascertained, with tolerable accuracy, by measuring the facial angle, as proposed by Camper, a famous Dutch naturalist. This is done by drawing a line in the direction of the base

of the skull, *ab* (Plate XIII., fig. 39), and meeting it by another line, *cd*, passing from the most prominent part of the forehead to the upper part of the upper jaw. In this manner, it is evident that the more acute the angle between the two lines, the less the forehead is developed, and therefore the anterior part of the brain is less developed, and *vice versa*.

In European heads (Plate XIII., fig. 39) this angle averages about eighty degrees, while in the negro race (Plate XIII., fig. 40) it is commonly about seventy. The ancient Greek sculptors were aware of the connection between a prominent brow and intellectual superiority, and when they wished to give the appearance of great intellectual power, made it ninety degrees, or even more. In the different tribes of monkeys it varies from sixty-five to thirty, and in the other animals it is still further diminished.

Although we give the name of instinct to the mental acts which we see occurring in animals, yet there can be no doubt that many of their actions, particularly those of the higher classes, are guided by memory and reason, and not only by instinctive propensities connected with appetites. Many striking instances of the truth of this could be adduced, but we must refer our readers to the various works upon the habits of animals.

CHAPTER XIV.

VOLUNTARY AND INSTINCTIVE MOTION.

VOLUNTARY and instinctive movements are characterized by being immediately preceded by the consciousness of a voluntary effort, and attended by a sensation which gives information of the degree and nature of the contraction that is excited. In a case of paralysis, we have the consciousness of the effort without the muscular sensation; and in sneezing, we have the sensation with very little of the consciousness of the voluntary effort.

The power and strength of muscular contraction are very great. The lower jaw of a man has been known to raise a weight of three hundred pounds, and that of the carnivorous animals is still more powerful. Sometimes the contraction of the muscles of a part have been so strong, as actually to break the bones to which they are attached. The strong humerus has been known to have been fractured in this manner.

As we have before mentioned, each contraction necessarily alternates with relaxation. When the voluntary muscles of any part are too frequently con-

tracted, a peculiar sensation is felt, to which the name of fatigue is given. These muscles, too, can remain in various degrees of contraction, as we see instanced by the various positions of the body during sleep.

The rapidity with which separate contractions of the voluntary muscles can follow each other is very surprising. Some men have the power of articulating fifteen hundred letters in a minute; and we shall see, in the next chapter, that this requires as many successive contractions of muscular fibre. Probably, too, each relaxation takes as long a time as the contraction. In this case, each of these contractions must have been willed and accomplished in the fiftieth part of a second, and during this time the mind must have been carrying on other trains of thought. A dog, in running, will sometimes perform as many as two hundred distinct contractions in a second, and other animals, as they can move faster, still more.

The difference between a voluntary and an involuntary motion is essentially this—that the latter is attended by volitions, which always succeed certain sensations, and are from the first performed correctly; voluntary movements, so as to accomplish the desired objects, on the other hand, are only learned after repeated trials, and repeated failures. Observation of the manner in which a child learns to walk and talk, will, in a moment, prove the correctness of this statement. The process of this sort of education depends upon two principles—first, on the muscular sensations which accompany the contractions being remembered, and serving as guides to the repetition of the same action; and, secondly, on the influence of the law of the association of ideas. Each of the muscular sensations, in virtue of this, suggests the volition which previously succeeded it in the performance of any complex action, so that, after some experience, the different volitions necessary for its performance become associated in trains, which follow one another without fixing the attention, and which, indeed, cannot be broken without a pretty determined act of the will. The influence of this law of association over complex motions is very great, and is well illustrated by the facility with which musical instruments are played, or by the exhibitions of the posture-master, in both of which cases, after some practice, very complicated movements are gone through with the greatest rapidity and ease.

Instinctive movements are well exemplified by the complex acts of sucking and swallowing, which are correctly performed by a new-born infant. The purely instinctive movements in man are, however, very few. Throwing the hands before us in the act of falling, winking when anything is approaching the eye, and moving the two eyeballs in such a manner as to turn the axis of both in the same direction, are instances of it. In the lower animals, however, very complex instinctive actions occur, and which we have every reason to believe are from the first performed perfectly and correctly. The insect class

afford several examples of such. Thus insects generally deposit their eggs in such a position, that the young larvæ will have a supply of food furnished for them in their immediate neighbourhood the moment that they are hatched. They even do this when they themselves are living upon a different food from that which will be necessary for the larvæ. Beetles, of a kind not uncommon in our fields, when about to lay their eggs, seek out the dead body of a mole or mouse, and having found it, excavate beneath it a hole sufficient to contain it, into which they contrive to drag it; they then deposit their eggs in the carcase, and thus the larvæ, when they come forth, find themselves in the midst of a supply of carrion. Another insect, of the nature of the wasp, which lives upon vegetable nourishment in the perfect state, yet whose larvæ are carnivorous, kills a caterpillar with its sting, and carries it to the place where it lays its eggs. Indeed, all the actions of wasps, bees, ants, and the insects that live in community, present to us most striking instances of what, we have every reason to believe, are purely instinctive acts, requiring many complex motions. Many volumes have been written concerning them, and the subject is not yet exhausted. To any of these we refer our readers, who may be desirous of investigating this interesting subject.

The bones of the body are so articulated together, that they only allow of motion in certain directions; and, therefore, considerable niceness is necessary in the manner in which the muscles whose contractions move them are arranged. Every muscle, too, can combine with others in various ways: hence the details of the arrangement of the muscles, and of the varied manner in which they produce varied movements, are very minute; so much so, as to render any attempt to consider them here out of the question. One or two general observations may, however, be made. Muscular fibres are generally placed obliquely to the line of direction in which the motion they communicate is to take place; the consequence of this being, indeed, that to communicate a given extent of motion a greater force must be used; but that they will undergo a less amount of contraction, in communicating that extent of motion, than they would have done had the direction of their fibres coincided with their line of action. This oblique direction also allows of their being tapered to a point, and concentrated into tendons, &c., or small portions of a bone. In regarding the action of muscles in moving the bones, and through them the parts which they support, we consider the bone as a lever, the joint at which it is moved as the fulcrum, the muscle as the power, and the weight of the bone and parts which it supports as the resistance. Generally speaking, in the animal economy the power is applied between the fulcrum and the weight. We may further remark, that almost every muscle has its antagonist, which performs an action precisely opposite to its own. Thus the joints are bent by one set of muscles, called flexors; and by a contrary or antagonist set, called extensors, they are

extended or straightened; and, in like manner, one set of muscles throws the limbs outwards, another set brings them nearer to the body.

It is necessary to mention, that there exists a tendency, which is not easily resisted, to what is called consentient movements of different voluntary muscles, *i. e.* when we contract one muscle, another one is almost instinctively contracted likewise. Thus, it is not easy to extend one finger without also extending the others of the same hand. This would seem to be owing to the muscular sensations, by which the efforts of the will are limited to individual parts of the muscular frame, not being, in such parts, so distinct and definite as in other parts.

The effects of repeated and habitual exercise of voluntary muscles upon other parts of the system are very important, particularly in a hygienic point of view. Habitual exercise accelerates the motion of the blood and the action of the heart. The circulation on the surface is particularly excited, and hence the secretion there is increased. The circulation in the muscles themselves is powerfully excited, and, as a natural consequence of this, their bulk and their strength are much increased. A familiar instance of this may be seen in the arms of a blacksmith, or in the legs of a dancer. An important consequence of the increased circulation, in the skin and muscles, is probably to derive an amount of blood from the capillaries of other parts, particularly internal parts. The mental efforts requisite for continued vigorous voluntary efforts, and the sensations which they excite, are incompatible with any continued exercise of the mind on other subjects. We can imagine, then, that we should find in an individual, who habitually refrained from voluntary muscular motions, a languid circulation, with its train of evil consequences—congestion of internal organs, diminution of the excretion of the skin, and a morbid and unhealthy condition of the mind, arising from want of healthy relaxation.

Many experiments have been made upon animals, with a view to ascertain what parts of the nervous contents of the cranium are essentially concerned in voluntary and instinctive motions. It has been found that such voluntary efforts can be made by an animal, as will be effectual to excite muscular contraction, after all the brain above the medulla oblongata has been cut away; but that all indications of those more complex acts of thought, which cause most of the combined muscular movements, disappear under such circumstances. We may therefore infer, that all those movements, where the volitions exciting them are dependent upon acts of recollection and trains of thought, depend upon some influence transmitted downwards from the hemispheres, and upper portions of the brain, to the medulla oblongata.

Moreover, upon irritating certain portions of the brain—and in the human species something of the kind has been observed in disease—certain movements take place; and, again, upon irritating others, other movements are induced.

Thus, the volition which acts upon the flexor muscles, and causes a forward motion, seems to proceed from the cerebellum; that which acts upon the extensors, and causes a backward motion, from the cerebrum proper; and that which causes sideway motions, from other portions.

In addition to being the seat of the volitions which cause forward motions, the cerebellum would seem to exercise other and very important influences upon voluntary motions. Animals in whom this organ is cut out, appear not only capable of sensation, but they give the usual indications of intelligence, and exert volitions which throw into action many muscles. But they are unable to regulate the contraction of these muscles in such a way as to perform any definite action, except such as are purely instinctive, as swallowing, &c.; and the purely voluntary movements are performed, or rather attempted to be, in a manner which is ineffectual for the purposes intended. The recollection, probably, of muscular sensation, which we have seen is so necessary for voluntary movements, depends upon the cerebellum, and is lost when it is destroyed, in the same manner as sensations and mental power are when the brain proper is separated from the body. We find that the cerebellum of man, in whom a greater number of complex motions are learned by experience, and associated in trains by means of the muscular sensations attending them, than in other animals, is more developed than that of any other creature. Besides, another fact supporting this connection between the cerebellum and the voluntary motions, was established by Sir William Hamilton, who ascertained that the young of those animals, which are soonest able after birth to perform definite muscular actions, have, at the time of birth, the largest proportionate cerebellum.*

Some of the most striking instances of voluntary muscular motions are to be found in the manner in which the various classes of animals perform different acts of locomotion. These are always accomplished by alternate contractions and extensions of the limbs, or the organs analogous to them. In the act of walking, the body is sustained upon the ground by one leg, and in quadrupeds by one pair of limbs, while it is dragged onward by the other. In running, both limbs are in the air at the same time for a short period. In leaping, the body is projected into the air by the sudden extension of the lower limbs, which had been previously bent. Insects possess the power of leaping great distances—to a much greater extent, indeed, proportionate to their size, than any other animal. A flea will spring to a height equal to two hundred times the length of its body, and another insect can jump two hundred and fifty times its own length. The propulsion of the body through water, or swimming, is in fishes principally effected by means of the tail, exactly in the same manner as that in which a boat is sculled through the water. The fins also assist in some

* It is probable that it is from the action of alcohol upon the cerebellum, that drunkards are occasionally incapable of properly "steering" themselves.

tribes, but in general these organs are used for maintaining the equilibrium of the body in water. Aquatic birds, and man, in swimming, use the extremities as paddles. Flying is effected by striking the air with prolongations of the upper extremities or wings, and of all locomotion requires the greatest waste of power. Some birds are endowed with wonderful muscular strength; thus the hawk is supposed to be able to fly a hundred and fifty miles in an hour, and the swallow, daily, probably flies six times that length. Some of the insects, however, can fly faster than birds, and a swallow has been seen to chase for a long time, and in vain, a dragon-fly.

CHAPTER XV.

VOICE.

It is probable that aquatic animals, in general, are only able to influence one another by means of signs and gesture, although some of them, perhaps, as the spermaceti whale, for instance, have the power of communicating with one another through the medium of vibrations of water, excited by muscular movements. If a straggler of this species be attacked at the distance of some miles from a shoal, a number of the other whales, in a very short space of time, bear down to his assistance. The animals, however, living in air, have the power of producing sounds indicative of various emotions and feelings.

Many insects possess this power, and some of them at least have an organ especially contrived for the purpose. In bees and flies, it depends upon a little membranous plate situated in one of the stigmata of the thorax. In others, however, it probably depends upon the vibration of the wings. Other sounds are produced by various acts of the animal, as, for example, when it is feeding. It is from the champing of the jaws together, that the very peculiar sound produced by an army of locusts is occasioned. But all the sounds issuing from insects, independently of such accidental causes, have for their purpose, undoubtedly, either the expression of a sensation, or a communication of something from one to another. Among the white ants, the soldiers, as they are termed, make a shrill vibrating sound, which would appear to be an order to the labourers to be attentive to their work, and these in their turn reply by a hissing sound. The queen bee has a sound which is evidently one of command. The ordinary bees have a power of emitting sounds expressive of anger, sorrow, and joy. The first of these is heard, for instance, if a hive be disturbed; the second, if the queen be taken away; and the last, if she be restored. In the majority of cases, the intention of the sound is clearly to apprise their fellow-

insects of their proximity; the sound called the death-watch proceeds from a small beetle which burrows among old timber, and is of this description: if it be answered, it is continually repeated; but if not, it is repeated in another place. This sound may be imitated by tapping with the nail upon the table, and the insect will readily respond to this. The grasshopper tribe are the most noisy of all. The common grasshopper of the fields, and the house cricket, are examples of it. The sound produced by the latter, especially at night, is, as every one knows, very loud. But some of the cicadæ of the New World quite eclipse ours; and some inhabiting Brazil can be heard at the distance of a mile.

The production of sound in the air-breathing vertebratæ depends upon the passage of air through a certain portion of the air passages, which portion is so constructed as to let in the air in vibrations; and in man, in especial, these vibrations are very much modified by the palate, tongue, lips, and teeth. To this modified voice the term speech is applied. In the class of reptiles, there is but one kind of sound produced, of the peculiar kind called hissing; but in the mammalia, almost every animal possesses some vocal sound, to which variety and expression can be given.

The human larynx* (fig. 41, Plate XIII.) lies between the trachea and pharynx. Its sides are formed by two large cartilages, called the thyroid, *a*, projecting in the front, to which projection the name of 'Adam's apple' has been fancifully given. These cartilages rest upon another, termed the cricoid, *b*, which by the base is connected with the trachea. Upon the upper surface, *d*, the back of the cricoid, two other cartilaginous bodies, *c c*, are seen, very small in size, and to which the name arytenoid is given. These are moveable, and supplied with muscles, by means of which their position can be changed. To them are attached two ligaments, which pass forwards to the thyroid cartilage, where they meet in the same point. These little bodies are the instruments, by means of which sound is produced. They are called the vocal cords. The space they include resembles a figure—that formed by the letter V—and it may, by drawing together the arytenoid cartilages, be narrowed. This is done in speaking; and the air, rushing through the narrowed aperture, sets these ligaments in vibration, exactly in the same manner as the tongue of an accordion is set in vibration. The rapidity of the vibrations, and therefore the tone of the sound produced, depends upon the degree of tightness of the vocal cords; and this is at will regulated by means of the muscles of the arytenoid and thyroid cartilages. The average length of these cords, in a man in a state of repose, is supposed to be 73-100ths of an inch, and in the state of greatest tension, 93-100ths of one; hence the greatest difference is about the fifth of an inch. The dimensions of the female larynx are much smaller, and the difference between the

* A clear idea of the human larynx may be obtained by examining that of a sheep.

state of relaxation and tension not more than the eighth of an inch. The compass of the human voice, *i. e.* the distance between its highest and lowest notes, is about two octaves. Each octave contains twelve semitones, and within each semitone a singer has ten distinct intervals. It follows, therefore, that there are at least two hundred and forty different degrees of distension, occurring, it is to be remembered, in the one-fifth of an inch, each of which can at once be determined by the will. In man, the variation from one interval to another will not be more than the one-twelve hundredth part of an inch. But many vocalists can produce more intervals in a semitone than ten. Madame Malibran is said to have been able to produce fifty. If this be correct, when we consider that the difference of the state of distension of the cords in a female is only one-eighth of an inch, this lady (the compass of her voice was at least twenty tones) must have been able to determine the contractions of her vocal cords to the almost incredible minuteness of the one-sixteen thousandth of an inch.

The vocal cords being longer in men than in women and boys, they commonly sing bass or tenor, while the latter sing treble, which is an octave higher than tenor. We formerly observed that the cause of the timbre of sound was not known, and hence it is impossible to explain what is the cause of the different qualities of different voices.

The lower animals can merely express pleasure or pain, in a general way, by means of the voice. Man alone has the power of producing, in immense variety, articulate sounds, which express his ideas and his desires, and to which is given the name of language.

All language is made up of a certain number of elementary sounds, which are combined into syllables, and so on into words and sentences. The number of these elementary sounds is small, being about twenty; but the infinite variety of combinations which may be produced by them is such, that no difficulty can arise if, in wishing to express a new idea, we require a new combination. Properly speaking, each of these elementary sounds should be represented by one letter; but in no alphabet is this managed, inasmuch as some letters represent two sounds. In English, *i*, for instance, is a compound of *a* as pronounced in *ah*, and *e* as pronounced in *theme*.

Simple sounds are divided into vowels and consonants. The true distinction between them seems to be, that the vowel sounds are continuous tones, modified by the shape of the aperture through which they pass, and which is formed by the lips and mouth; and that, in uttering the consonant ones, there is a stoppage of the breath in its passage through the larynx. Hence we can prolong the sound of a true vowel as long as the breath is supplied from the lungs; but the sound of a consonant is momentary. Some of the consonants require a complete stoppage of the breath, as *b, p, d, g, l, k*; the stoppage of the breath in pronouncing the others is not so complete.

The inhabitants of hot climates speak a language full of vowels, while those inhabiting cold ones have a great number of consonants in them. It has been conjectured, with some ingenuity, that this in part depends upon the unwillingness that a person in a cold climate has to keep his mouth open, so as to allow the continuous sound of vowels to emerge.

CHAPTER XVI.

THE INVOLUNTARY ACTIONS OF THE MIND UPON THE BODY.

THE involuntary actions excited in different organs of the body by emotions and sensation, present a very interesting field of observation to the physiologist, and are moreover of very great importance to the practical physician. We commence the consideration of them by examining the effects upon the body, which can be distinctly ascribed to mental emotions.

In the first place, when acting in full force, they bring on involuntary contractions of the voluntary muscles, of which we are conscious, but which we do not by any effort excite, and which we cannot counteract, except in an indirect manner, either by fixing the attention upon some other object, and thus superseding the emotion, or by exciting other muscular attractions, which antagonize those we wish to conceal. Of this nature is the complex action of laughing, excited by the feeling of the ridiculous; of crying, by the emotion of grief; and of the slight contractions of the muscles of the face, which express, and are caused by, various emotions, and the interpretation of which belongs to the art of Physiognomy. It is to be observed, that all these differ from instinctive acts, inasmuch as no voluntary effort which intervenes between the emotion and the action is felt to be made in these instinctive acts. Laughing and crying are produced much in the same way. They essentially consist in a long, often an interrupted inspiration, followed by several short ones; the ascent of the diaphragm is repeatedly stopped by short contractions of its own muscular fibres, and by those of the abdominal muscles; the muscles of the top of the windpipe are also contracted, and regulate the escape of air and the vibrations of the air, while the muscles of the face are so contracted as to give expression to the action.

Besides these definite actions of weeping and laughing, there are other more vague and general contractions, which are occasionally brought on by emotions. Of this nature are the tremblings from fright, and the writhing of the body brought on by emotions of horror.

Further, there are strong mental emotions, which have the power of diminishing or increasing the strength of voluntary contractions all over the body. Anger, hope, &c., often strongly do the latter. We have many illustrations of this in the increase of strength which has come on from the influence of military or religious enthusiasm. There are many instances on record of paralytic persons recovering the power of their limbs, under the influence of violent emotions of this kind. Grief and fear, on the other hand, frequently diminish the intensity of muscular power, while despair totally annihilates it.

Besides having such an effect upon voluntary muscular motion, mental emotions have a powerful influence over the organic functions of the body, and particularly over the involuntary motions connected with the circulation. Joy, hope, &c., possess an exciting effect over such, and grief, fear, &c., a depressing effect. When the exciting emotions are applied in such a manner as to act permanently, and without violent agitation, as in the emotion of pleasure that attends a pleasing occupation of the mind; that of hope, from the prospect of lasting enjoyment; that of benevolence, or that of gratitude—especially when they succeed opposite states of the mind—they have a decided beneficial effect upon the circulation, especially through the capillaries and the different secretions. They produce a slight but permanent glow upon the face; they quicken the flow of fluids through the coats of the eye, and hence produce increased brilliancy of that organ; they increase the insensible perspiration, and also the quantity of carbonic acid thrown off at the lungs; they promote the actions of digestion, and favour nutrition; they undoubtedly have the power of protecting the body from the effects of cold, malaria, and contagion, and hence protect it against the most powerful causes of acute disease. In a word, they have a tonic and highly beneficial effect upon the circulation, and the system at large. When, however, these exciting emotions, or passions, act more suddenly and violently, their influence is chiefly to be observed in the large vessels and the heart. They bring on increased pulsation, heat, and throbbing—a state, in fact, of temporary fever, often if not always followed by depressing effects, and unattended by any beneficial results. Anger acts sometimes so powerfully upon the circulation as to produce death. The effects of these more violent exciting emotions are generally much more local than those of the gentler ones. Thus surprise excites the heart's action, and occasionally brings on internal hemorrhage, while the circulation in the skin is lessened, and this organ is pale and contracted. Shame has a powerful effect upon the circulation in the capillaries of the face and neck, producing blushing, while the rest of the body, and even the rest of the surface, is unaffected.

The feeling, on the other hand, of listlessness and ennui, of permanent depression from continued sorrow and disappointment, produces effects upon the circulation, and upon the secretions, precisely the reverse of those which we

have just considered. They make the face pale and sallow, the eye dull, the perspiration less; they diminish also the quantity of carbonic acid exhaled from the lungs, impair the digestion, and make the body waste and become weak; they strongly predispose the system to receive the bad effects of cold, malaria, and contagion, and hence to inflammations, fevers, and agues; and they both facilitate the attack, and retard or hinder the cure, of many a chronic disorder. Moreover, if these distressing emotions are suddenly and powerfully experienced, fainting, or even death is brought on. This is frequently seen when people are exposed to sudden feelings of grief, fear, horror, disgust, or despondency.

Different passions affect variously and rapidly the secretions of the lachrymal glands of the mouth, of the kidneys, of the liver, and still more of the stomach. Hence depressing emotions strongly predispose to diseases of the organs of digestion.

These emotions likewise often produce sensations: thus, fear brings on a peculiar feeling of chilliness and horror; and disgust, feelings of nausea.

The facility with which emotions can produce these muscular contractions, alterations upon the circulation and the secretions, and certain sensations, varies very much in different individuals. Generally speaking, persons of a nervous temperament are more under their influence than those who are not so; weak people more than those in a state of strength; and women and children more than men. Some people, too, are more readily affected by one kind of emotion, and another by another, and some parts of the body are more affected in one person than in another.

These few observations upon the effects of mental emotions upon the body, and over which the will has no control, will explain many of such phenomena as are not the result of imposture in the science of animal magnetism.

The effects of sensations upon the system are very similar to those of emotions. Laughter and weeping are excited in some, particularly in nervous people, by the sensation of tickling in any part of the body, and by the sensation of pain. Sighing is the result of the sensation in the chest, produced by venous blood being in greater quantity than usual, in consequence of inspiration not having been perfectly performed for some time, generally on account of some strong mental occupation, or emotion, having prevented us from paying attention to the sensation which prompts us to inspire. It is merely a prolonged inspiration. Yawning seems to depend upon a sensation of general lassitude, either from fatigue or inactivity of the mind or body. It consists of a deep inspiration, followed by a long expiration, and is attended by a contraction of those muscles which depress the jaw, and occasionally of other muscles. Coughing and sneezing are complex actions, which take place independently of the will, and are induced by sensations in portions of the mucous membrane of the air passages. In these acts there is a long inspiration, followed by a long expira-

tion, both of these being much stronger in sneezing than in coughing. The aperture of the larynx is closed so as to compress the air within the chest, and then suddenly opened so as to allow it to escape, which, of course, it does with considerable force, thus carrying with it any matter which is obnoxious to the air passages, and which, by its presence there, brings on the sensation. In sneezing, it is further necessary that the current of air be directed through the nostrils, by the tongue being pressed against the palate, so as to prevent its escape through the mouth.

Certain other sensations bring on the spasmodic movements of the diaphragm, called hiccup, eructation, and vomiting. In eructation, there merely seems to be a relaxation of the muscular fibres of the œsophagus, which allows the contents of the cardiac end of the stomach to arise to the mouth; but in vomiting, along with this relaxation of the œsophagus, contractions of the diaphragm and abdominal muscles take place, which, pressing upon the stomach, expel its contents. These contractions are preceded by a peculiar sensation, which we term nausea, and which is often attended with faintness or vertigo. At the moment of vomiting, the œsophagus is believed, too, to assume an inverted action. After the sensation of nausea has begun to diminish, there is a sudden and copious flow of saliva, and very frequently of sweat. In cases where vomiting is long continued, the stomach and duodenum assume an inverted action, and hence bile is brought up.

The sensation of nausea is brought on by many causes. Horror and disgust, as we just mentioned, occasion it; so do many irritations of the stomach, diseases of the brain, certain impressions upon the back of the mouth, and many diseased states of the heart, bowels, kidneys, &c.

Various sensations, also, have a modifying power over the involuntary muscles. Thus nausea generally depresses the action of the heart; so does the sensation of intense cold, of intense pain, of a blow in the pit of the stomach, and sometimes of certain smells; and so do the sensations produced by inflammation of the bowels. On the other hand, the sensations of warmth, of a lighter degree of pain, of grateful impressions upon the stomach, &c., increase it. Sensations, moreover, have a power over different secretions—over that of the lachrymal glands, mouth, stomach, liver, &c.

It is a very curious fact, that the changes produced upon the body of one individual, by the involuntary action of the mind, are at once understood and appreciated by another. The effects of emotions and of sensations upon the human countenance, or the attitudes and gestures, are no sooner beheld, than the spectator is aware of the mental state of the individual experiencing them. Nay, there are many reasons which lead us to think that this is not the effect of education or of experience, but that it is instinctively felt. Thus, a child evidently understands all these signs of mental affections at a very early date,

long before he can, by experience, have formed any idea of the connection between the feelings and the expressions. We feel them, too, more quickly, and also more powerfully, than the expression of them by words. Moreover, the varying expressions of the voice, manner, and countenance of a person, under the influence of strong natural feeling, convey a truer idea to the spectator of the nature of his feelings than any words could do. Of the rapidity and precision with which we interpret the natural signs of the passions, we have a familiar instance in theatrical performances, particularly pantomimes.

Indeed it would seem that the use of these sensations and emotions upon the body, at least of those which exhibit themselves externally, is to be found in this interpretation of them by other men. Nature does not merely provide in each individual constitution for that individual's wants, it adapts it for social intercourse, and makes provision that its sufferings may be alleviated by sympathy, and its pleasures enhanced by participation; and thus insures the union and co-operation of many, for effecting such purposes and ends of our being as individual exertion would be inadequate to produce.

The truth of this observation will be felt still more strongly, when we consider that there exists in the mind of the spectator, along with this instinctive interpretation of the natural signs of sensations and emotions, a strong inclination to imitate them. This is illustrated, in strictly voluntary action, by the tendency which children, and to a less degree adults, have to copy the voices, tones, shrugs, &c., of those with whom they much associate; but in the phenomena of which we are treating, in those produced in the body by the involuntary action of the mind, this principle of imitation is still more strongly marked. Every one is familiar with this in cases of yawning, laughing, weeping, and nausea; and more remarkable instances, although of rare occurrence, are seen in involuntary contractions of the limbs from watching such in a person labouring under a spasmodic disease.

The degree in which the mind of the spectator, in such cases, participates with the actions of the actor or sufferer, depends upon various circumstances. It depends upon the nature of the feeling or emotion; the gentler ones being more easily communicated, and the rougher passions exciting less sympathy at first, but if, by degrees, infused into the mind of the spectator, rousing him to much stronger emotions. It depends upon the disposition of the spectator, being, in general, more elevated in those of a nervous disposition, and therefore more easily in females than in men, and in youth than in age; and it depends, in a very remarkable degree, upon the numbers present, it being very much increased by a multitude; and thus the most striking examples of this instinctive imitation of the effects of violent emotion are always seen in large assemblies. Illustrations of this are to be found in the excitement of courage, or the spread of panic, among soldiers; in the mad extremes to which party

violence sometimes carries people; in the exhibitions of religious fanaticism; and in the propagation of many nervous disorders in schools, hospitals, &c.

CHAPTER XVII.

SLEEP, DREAMING, AND SOMNAMBULISM.

As the voluntary muscles require an alternation of rest and motion, so also does the nervous system need its time of repose, to which the term sleep is applied. Sleep is essentially characterized by the suspension of all voluntary power, both over the muscles and the trains of thought in the mind. Sensation is not during sleep suspended, as respiration, which we have seen depends upon it, continues; instinctive movements of the limbs even take place, as when they are put in a constrained position they are shifted, and if the impression be strong the sleep is interrupted. Still the sensations are blunted, as we see in the respiration, which is feebler and slower than during waking, and in the slight impressions which are not felt. If we notice our own feelings when falling into slumber, we remark that we are gradually losing the power of fixing our attention upon any particular train of thought, and that the images which are passing before our minds assume the appearance of real objects.

The organic functions are variously affected during sleep. The circulation is more languid than in the waking state. This probably arises from the absence of the stimulating effect of many sensations, and of muscular movements. Digestion and assimilation seem in general to be promoted by sleep; and in hot climates, a nap after taking the principal meal would appear almost indispensable. The reason of this probably is, that wakefulness, exercise, &c., promote the flow of blood in the skin, particularly in hot countries, and thus abstract from the internal organs. Perspiration, and the secretion at the lungs, are diminished in quantity during sleep, and the whole body is, from its enfeebled circulation, more easily chilled. Hence the system is more liable to catch during sleep those diseases the causes of which are at first to depress the circulation in the capillaries of the surface.

Healthy sleep is merely the consequence of the activity of the changes which take place in the nervous system during waking. The disposition to go to sleep is, at least within certain limits, in proportion to the number and intensity of these changes, and it is promoted by whatever takes away the causes of mental employment, or anxiety. Thus sleep is induced by darkness,

by silence, by the absence of all pain, or of any strong impression upon the organs of sense, by an agreeable temperature, and by mental tranquillity. It is also promoted by gentle and uniform sounds or murmurs, as the humming of bees, or the flow of a fountain. This class of sounds consists of such as can withdraw the attention of the mind from its own reflections, but which are not of sufficient importance to interest the attention to any considerable degree. Sleep is also promoted by causes which increase the flow of blood to the brain.

After sleep, the voluntary mental exertions, the trains of thought, and the senses, are more lively, and more easily and pleasantly performed than before; but the full power of the voluntary muscles, and the strength of the circulation, are not fully restored until food be taken.

These are the principal conditions which characterize sleep. It essentially depends upon some change in the actual state of the nervous system. The nature of this change is quite unknown.

During profound sleep no mental acts take place; but during natural sleep, the state of the mind called dreaming is very common. Dreams may generally be traced to some actual occurrence; but these are so perverted, and so jumbled with imaginary transactions, that the most extraordinary combinations are produced. In them the succession of thought is not regulated by the will, and the images which pass before the mind are always considered as realities. One of the most curious circumstances attending dreaming is, that although we meet in our dreams with most extraordinary adventures and personages, we are never in the least surprised, but almost invariably take such as matters of course.

The amount of sleep necessary for refreshing the nervous system, varies in different individuals from six to eight hours in the twenty-four.

There is an imperfect state of sleep, to which the name of somnambulism is given. This is characterized by a partial restoration of voluntary power over the muscles and the mental operations, while the delusion of sleep, in some degree, continues. Moreover, the principal associations which connect trains of thought together are altogether suspended, and the individual subject to this state, while in it, neither acts nor speaks as he has been accustomed to do, although his mind does act with great energy upon certain subjects. When he awakes from this state, he, rather curiously, seldom or never remembers what he has been about while in it. Somnambulism, in some respects, resembles what has been called trance—a state of the body which, if it has ever really existed as described, has doubtless been grossly exaggerated.

Reverie is another and similar state of partial hallucination, with suspension of the associating powers of the mind. This state is sometimes induced by drinking spirits, sometimes occurs in nervous diseases, and has very frequently been brought on by mental emotion, particularly where numbers were

present. When it occurs in the presence of an animal magnetizer, the believers in this supposed science term it magnetic sleep.

CHAPTER XVIII.

MAN AND THE VARIETIES OF THE HUMAN SPECIES.

WE purpose, in this chapter, to take a cursory glance at some of the more important differences that exist between man and other objects of the animal creation, and between the different races of men.

Man is the only animal intended habitually to assume the erect attitude. Some of the monkey tribe, particularly the orangs, somewhat approach to him in this particular; but the movements of these animals are never agile and easy unless they are assisted in them by their upper extremities. In conformity with this, the human foot is, as compared with the rest of the body, larger, broader, and stronger than that of any quadruped. Its strength and size enable him to support himself upon one leg, which no other animal of the mammalia can do.

Man alone can be said to possess a hand. "We ought," says Sir Charles Bell, "to define the hand as belonging exclusively to man," in whom its perfection depends upon the size and position of the thumb. This organ can be brought into powerful and most exact apposition with the extremities of any of the fingers. Monkeys are the only animals that have anything like an approximation to the human thumb; and in them it is so short and weak, and their fingers so long and slender, that the tips of the two can scarcely be brought into apposition, and with no degree of force. Very short consideration will convince any one of the importance of this arrangement of the human hand in any operation requiring the slightest dexterity.

Man alone possesses feet and hands totally unlike each other. The extremities of the monkeys may be all considered as organs of prehension, or hands, while in other quadrupeds they are organs of support and locomotion. The only farm animal that has the sense even to steady what it is eating with its fore-paws is, we believe, a pig.

Another remarkable peculiarity of man is, that he is born without any external clothing, or natural arms of either attack or defence. On the rest of the animated world, Nature has bestowed the means of either concealment, flight, or defence. Man has nothing to defend himself with; but instead of

these, he is endowed with reason, guided by which he has fabricated arms; and this naturally defenceless being has conquered the whole of the living world. Some he has exterminated, others he compels to labour for him, and the remainder he uses for his clothing, his food, or his sport.

Besides peculiarity of structure, man is distinguished by many peculiarities of economy. He can live in all climates, and with equal ease under all different pressures of the barometer, and can subsist upon the most varied food. He can perhaps, too, endure longer fatigue than any other being. Most animals, on the other hand, can only exist in one climate, and their food must always be of one kind. Man, too, is of much slower growth, and much longer in attaining to maturity, than any of the animals. He is, at the same time, the longest lived.

Striking, however, as are these differences between the structure and economy of man, as compared with those of the lower animals, still more so are those of his mental powers. Almost all animals show great moral feeling in the defence of their young, as long as they remain ungrown; all perform certain actions with a definite end, and many species unite together to perform sometimes complicated actions. But they never invent anything. The same actions have been performed in the same manner ever since the days of Adam. No individual animal ever raises itself above the herd of its fellows, does something new, or alters and improves its condition. Very different is the case with man. Born without weapons, weak, and defenceless, but with the power of reflection and invention, not only has he subdued the animal creation, but he has subjected every element of the material world. The richest webs are, by most complicated processes, weaved to clothe him; houses and palaces are erected to shield him from the sun and from the cold; does a desert or an ocean intervene between him and the object of his desire, the conquered camel traverses the one, and the curiously-constructed ship the other; he creates fire, and by its means prepares a thousand varieties of food, ransacked from the air, the earth, and the ocean; and he seizes and prepares the juice of the grape for his beverage. Should the elements prove adverse, by his intellect he can sail his bark in spite of them; he can mock at time, and annihilate space. When the sun goes down, he has his artificial light prepared. He has stopped and made rivers, joined oceans, hewn down forests, filled up marshes—nay, he has measured the course and magnitude of the very stars in heaven. The consciousness of his dignity has given him such an air of superiority and command, that the wildest and fiercest beast of the desert quails beneath his glance.

In conjunction with this faculty of invention, man possesses the power of communicating to his fellow-men, not only his inventions, but all his hopes, fears, and wishes, by means of spoken language. Animals cannot do this, not

because their organs cannot enunciate the requisite sounds, but because they have not that power of association of ideas which connects the sound with the idea.

There are, as every one knows, a great many varieties of the human race; but there is no doubt that all are sprung from one and the same common ancestor. The differences depend upon accidental circumstances. Still greater differences in the same species are observed in some of our domesticated animals. We may instance dogs, rabbits, poultry; each of which is undoubtedly sprung from a common stock. Pigs afford a remarkable instance of this deviation from the original standard. There is no doubt that all varieties of swine descend from the wild boar; and we also know that pigs were unknown in America until carried thither by the Spaniards. Yet even in this short time there are various breeds of swine in the New World: one race has toes half a span long. The swine of the Old World differ very much from each other: some in Hungary and Sweden are said to have a solid hoof; in others, the hoof has five clefts. The Chinese breed, again, is very peculiar; in Guinea, they have long ears pendant upon the back. Even in this country we have many very different varieties.

Not a few of the varieties of the different races of mankind are dependent upon differences of the structure and proportion of various parts of the skeleton. The most marked of these are those of the skull, or cranium. Pritchard refers all these to three varieties—the oval cranium, the elongated, and the broad or square-faced one. The oval form (Plate XIV., fig. 42) is found in almost all the inhabitants of Europe, Northern Africa, and Western Asia. In this variety, the head is more rounded than in the others, and the forehead is more prominent. The features in men of this variety are more regular and free from projections than in any other. The elongated form of skull (fig. 43) is found in Negroes, New Zealanders, &c. It appears as if it were laterally compressed, and the cheek-bones project forwards, as also does the upper jaw. This gives a peculiar ferocious and animal appearance to the countenance. The brow is narrow, compressed, and retreating. With this form of skull are usually associated thick projecting lips and a retreating chin. The last, or square-shaped form of skull (fig. 44), is found among the north and north-eastern Asiatic nations, and the American Indians. In these, the zygomata project outwards, the cheek-bones project from under the middle of the orbit, and turn backwards. The upper part of the face is remarkably flat, the nasal bones being little more projecting than those of the cheek. Thus, in this variety, the face is broadest transversely from one cheek-bone to another, and, gradually narrowing above and below, gives to the countenance something of a lozenge shape. Within these limits there is an immense variety of forms of the skull. Every nation almost has its peculiarities, easily perceived, but described with difficulty.

Considerable differences also exist in the different varieties of mankind with regard to the structure of other parts of the body. Some of the most striking of these are seen in the Negro, as compared with the European. His fore-arm is generally longer; his feet are often turned out in the manner called splay-footed; and his heel-bone, instead of being arched, is on a line with the other bones of his foot; his hands, too, are narrower than those of an European; and his fingers long and flexible.

Great differences exist in different individuals with regard to their stature. In the temperate climates of Europe, this may be said to range from four and a half to six feet. Very considerable deviations from this are, however, occasionally met with. It is an old and popular, but erroneous opinion, that mankind were formerly of a larger stature than now. There is no doubt but that giants were as rare, and as much objects of curiosity, in time of old as they are now; and all remains of human bodies found in ancient tombs, prove that the stature of ordinary mortals, two or three thousand years ago, was the same as that of our contemporaries. There are many authentic instances, however, of men who have far exceeded the height of six feet. The King of Prussia, who had a passion for collecting tall men, had a Swede in his guards who measured eight feet and a half. Many people—and curiously enough they are generally Irishmen—have been and are exhibited in shows, &c., who were eight feet and more in height. On the other hand, there are many instances of dwarfs of very small stature. Bebe, the dwarf of King Stanislaus, was not two feet high. Giants and dwarfs are hardly ever healthy or well-proportioned. Generally speaking, the head of a dwarf is too large, and that of a giant too small, compared with the rest of the body. The inhabitants of the Arctic regions are generally stunted in size; the Bushmen of Africa are still more diminutive; while, on the other hand, the Patagonians, and other tribes, appear to be taller than Europeans.

Different varieties of men differ remarkably in the colour of their skin and hair. Dr. Pritchard has reduced these to three principal varieties. The first of these is the Melanocomous, or black-haired. This is the most common of all. The colour of the skin is very various, ranking from the intense black of the African to the more dilute shade of the black-haired European. The duskiness is sometimes mixed with red, as is the case with the copper-coloured American Indians, and sometimes with yellow, as in the olive-coloured Asiatic, Spaniard, &c. The second variety is termed the Leucous, or Albino, specimens of which are occasionally seen in travelling exhibitions. Albinoes occur every now and then in all nations; but are, perhaps, more frequently found in hot climates. They are distinguished by the absence of all colouring matter from the skin, hair, and eyes. Hence their skin is of a milky or pinkish white hue, their hair silky white, the iris of their eyes rosy, and the pupil red. The

third variety is called the Xanthous, or light-haired variety, including all those individuals who have auburn, brown, yellow, or red hair. The countenance of members of this variety is fair, acquiring, on exposure to heat and light, a brownish or red tint. The eyes are light-coloured: this variety may spring up in any black-haired tribe; but it is most common in the more northern countries of Europe. This division of the varieties of colour applies equally to all the domesticated animals.

Mankind, taken generally, have been variously divided by different authors. Cuvier makes three divisions; Pritchard, seven; and Blumenbach, five. The last mentioned division is as follows:—

First, the Caucasian, or Iranian of Pritchard. In this variety the skin is white, inclining to be either brown or rosy; the cheeks are red; the hair is generally wavy. The cranium is large and oval, and the face small, the forehead being highly developed and expanded; the features are distinct, the nose generally narrow and approaching to the aquiline shape, and the mouth small; the lips, especially the lower one, are gently turned in, and the chin is full and rounded. The intellectual powers of this variety are far more highly developed than those of any of the others. The Caucasian race embraces the ancient Greeks and Romans; all the modern inhabitants of Europe, except the Finns; the old Assyrians, Medes, and Chaldeans; the Scythians and Parthians, Philistines, Phenicians, Syrians, Jews, Circassians, Armenians, Turks, Arabians, Persians, high caste Hindoos, Affghans, Abyssinians, Egyptians, Moors, &c. &c.

The second variety is the Mongolian, or Turanian. This is characterized by an olive complexion and black eyes; straight, strong, and thin black hair; square head, and retreating forehead, flattened, and broad face; small and flat nose; cheeks projecting externally; the eyes situated very obliquely; the chin slightly projecting; the ears very large; the lips thick, and the stature generally low. In it are included the tribes of Central and Northern Asia, as the Mongols, Kalmucks, Samoides, and many others; the Chinese and Japanese; the inhabitants of Cochin China, Siam, Ava, &c.; and the Finns of Europe, including the Laplanders and Esquimaux.

The third variety is the Ethiopian, or Negro. In its members the skin is black; the hair black, woolly, and curling; the skull narrow and elongated; the forehead narrow, low, and slanting; the cheek-bones projecting, as also do the jaws, while the chin retreats; the eyes, of a dark colour, are prominent; the nose is broad, thick, and flat; and the lips, especially the upper one, are very thick. This variety includes all the Africans not before mentioned.

The fourth variety is the American. In this variety the skin is of a dark-red colour; the hair black, straight, and strong; the head narrow; the nose full, the mouth large, and the lips somewhat thick. The countenance and skull

resemble those of the Mongolians. This variety includes all the native tribes of America, except the Finns of the North.

The fifth is the Malay variety. The colour of the men belonging to this variety, is from a light tawny to a deep brown; the hair, black and abundant, is more or less curled; the head is narrow, and the face large and prominent; the nose is full, and the mouth large. In this division are placed the inhabitants of Malacca, Sumatra, Java, Borneo, and the neighbouring Asiatic islands; of the Moluccas, Ladrones, and Philippine islands; of New Holland, New Guinea, New Zealand, Van Diemen's Land, and all the islands of the South Sea.

All these varieties have a great many subvarieties. We may take a rapid glance at the subvarieties now inhabiting Europe. Of the Mongolian variety, are some dwelling between the Scandinavian peninsula, on one side, and the White Sea; and the great lakes of Ladoga and Onega, on the other. The Laplanders inhabit that part of the country between the northern extremity of the White Sea and the Gulf of Bothnia; the Finns are farther south; at the eastern part of the Gulf are the Inghers; and south, the Esthonians and Livonians. A few of these are pagans. Another Mongolian class is found in the Magyars of Hungary. Then there are several Mongolian tribes about the Volga and Ural, along the Uralian range of mountains. The most northern of these tribes is the Samoides; more south, are the Linyanes, Peonians, &c., and the Nomadic tribes of Calmucks and Kirghises.

The Caucasian inhabitants of Europe may be arranged into four classes: the Hebrews, the Celts, the Teutonic race, and the Slavonian. The Hebrews are scattered over the whole of Europe; but are most numerous in Russia, Poland, Austria, and Turkey. The Celts, originally divided into Gauls and Cymri, probably have an eastern origin. In the beginning of history, we find them occupying a great part of central and western Europe. Two thousand years ago their power was evidently on the decline, and they have since gradually yielded, perhaps, to the superior perseverance of the Teutonic race. The population of France and Spain have a considerable admixture of Celtic blood, and a few tracks of country are still occupied by the remains of Celtic nations. Of these are Wales, the Scotch Highlands, Ireland, Brittany, the Basque Provinces, and, perhaps, Cornwall.

The Teutonic, by far the most persevering and industrious race of man, and also, perhaps, the one with more capacious mental powers than any other, and the one which has been uniformly successful in its struggles with the others, may be divided into three great branches: the High German, including the inhabitants of Upper and Middle Germany; the Saxon, including the English, Scotch, Anglo-American, the Dutch, the Flemings, and the Saxons proper; and the Scandinavian, including Swedes, Danes, Norwegians, and

Normans. The origin of the Teutones is undoubtedly Asiatic. When their immigrations into Europe began is not certain; but it would seem that they entirely ceased in the fourth or fifth centuries. When they first appear in history, they are known by many names—Saxons, Alemanni, Franks, Marcomanni, &c.; and they are found inhabiting Germany, Holland, Flanders, and other northern countries. In the time of Cæsar, and during the Gallic war, a most deadly enmity commenced between the Romans and the Teutones, which, after a fierce struggle of centuries, ended in the fall of the great and mighty empire of Rome. The Franks conquered and possessed Gaul; the Goths, Dacia and Illyrium; the Visigoths, but more partially, Spain; the Longobards, Italy; the Saxons, England; and other Teutonic tribes, whose deeds this is not the place to record, occupied other territories.

The origin of the word Teutonic is very expressive of the race. It is from the root *thu*, to do, to act. And it is to a staunch and steady perseverance in doing, that the Teutones owe their well-earned triumphs. Every great and useful invention which the modern world can boast of has come from them. They invented the watch, the gun, the printing-press, the modern ship, the steam-engine, and the electric telegraph. As a race they have never failed in what they have attempted. Celtic nations have done great things with a rush, and a suddenness, and an enthusiasm which characterizes them; but the Teutonic have reserved their enterprise for vast and mighty plans, which they have perseveringly carried on for centuries. After a long and arduous struggle they broke the power of Rome, and founded monarchies which remain to this day in their pristine vigour; they have seized the middle and western parts of Europe; and, lastly, they have spread over the mighty continent of North America, and are but now threatening the South. Their character is remarkable—capable of the strongest passions, the grandest ambition, the most acute feelings: yet these are under the restraint of the intelligence, and the expression of them they can control; and there never existed a race capable of forming such grand conceptions—of working them out with such prudence, courage, and perseverance—and of behaving with such moderation in the day of victory.

The Slavonian subdivision of the Caucasian variety of man is both a numerous and important one. This race now extends from the Elbe to the Pacific, and numbers more than seventy millions of people, living under the dominions of Russia, Austria, Prussia, Saxony, and Turkey. The name is derived from *slava*, glory. The Slavonians besieged Constantinople in the sixth century, where, however, they were repulsed by the famous Belisarius. After this they settled upon the banks of the Danube, and they have gradually become divided into the various nations which are now composed of them. These are the Bohemians and Moravians, inhabiting Bohemia and Moravia, and also scattered over Hungary and Silesia; the Poles; the Muscovites or

Great Russians (much mixed, however, with Finns); the Lesser and the White Russians; the Slovacks, inhabiting part of Hungary; Croats, also inhabiting Hungary; the Illyrians in Dalmatia, Corinthia, and Carniola; the Servians, the Bulgarians, and Bosnians, in Turkey; and the Sorbi in Lusatia.

A degree of admixture, especially of subdivisions, appears to increase the physical and mental strength and vigour of a nation. No country has had so much of this mixture as Britain, and it must be conceded that no country ever equalled her in wealth, strength, and dominion. Her empire is more extensive than that of all Rome; her armies more successful; her navies more glorious; her commerce more extended. All this seems to be the result of a mixture of grandness of conception, with an unwearied perseverance, and a determination never to lose heart in carrying out purposed plans. To this must alike be attributed the exalted position of the English merchant—undeniably at the head of his order—the success of the bloody fields of a Cressy, a Salamanca, a Waterloo, an Assaye, or a Sutlej; or the victories of the Nile, or Trafalgar.*

* We have, in this chapter, considered the Celts as the aboriginal inhabitants of Britain. It is now, however, ascertained, that this island was, previous to a Celtic invasion, inhabited by an aboriginal race, regarding the members of which recent antiquarian researches have brought to light some curious facts.

The tombs and the houses, both containing weapons and utensils of this race, are very numerous. Both are distinguished from other similar constructions of the later Celts, by their not containing anything manufactured from metal. Not only have these poor savage ancestors of ours been ignorant of the use of iron, but even tin and copper, which were certainly employed ages before iron, were quite unknown to them. The only hard material that they possessed, with which to construct implements or weapons, was stone; and the rudeness of the construction of everything that they made, shows how inadequate this substance was for all artistic purposes.

Strangely enough their houses were all underground. Numerous examples of these *weems*, as they are called in Scotland, have been found. Indeed, it is probable that there is scarcely a heath that would not, upon investigation, be found to possess one or more of them. They are singularly frequent in Aberdeenshire, and numbers of those occurring there have been examined. Besides weapons and implements, the remains of fires are to be found in them, and the bones of animals, whose flesh has doubtless been consumed by their previous occupants. These bones are sometimes those of deer and oxen; but the most abundant are those of sheep, and of that small breed of sheep now confined to Orkney and Shetland. The implements, &c., found in them are of a very rude character.

The skeletons of these aboriginal inhabitants, whom Dr. Pritchard proposes to call Allophyllians, are peculiar. In size they are generally small; the hands and feet are particularly so; but the greatest peculiarity is to be found in the skull, and that of a nature which would seem to indicate a low mental development. Those interested in this subject will find ample details in Dr. Wilson's learned and instructive work on the 'Archæology and Prehistoric Annals of Scotland.'

CHAPTER XIX.

VARIETIES OF TEMPERAMENT AND AGE.

BESIDES those well-marked distinctions which exist between the different races of man, men also differ from one another in their physical and intellectual powers and endowments. It has been thought possible to divide them into certain classes, to which the name of temperaments has been given. A temperament may be defined to be a peculiar state of the system, by which it acquires a tendency to perform certain actions. Great attention was paid to this subject by the ancient Greek physicians. They described four temperaments—the sanguine, the phlegmatic, the choleric, and the melancholic. We can readily perceive the tendency to these temperaments to be well marked in many people. A still more important one should be added—the nervous. Those of this temperament have a peculiar mobility, or easiness of excitability of the nervous system; are far more liable than others to the disordered sensations we have alluded to before; and their bodies are far more subject to be affected by the involuntary actions of the mind.

In speculating upon temperaments, we should not forget the effect of education, will, and habit, in modifying such constitutional tendencies. This is illustrated by the difference between the strong body, the vigorous circulation, tenacity of purpose, and little versatility or quickness of mind, of the countryman; and the weaker frame, feebler circulation, greater activity of mind, but with less determination, of the inhabitants of large towns. The effects of habit upon intellectual operations is to render them more acute, while repetition of sensations blunts or diminishes them. In this way disagreeable impressions cease to be so, and even pain becomes comparatively indifferent.

Still greater differences exist between the same man at various ages. The infant resembles in many of its vital actions the cold-blooded animals. Its circulation is easily repressed; its power of generating heat small, and indeed insufficient of itself to maintain life; its mental powers but little established, and most of its time is spent in sleep. Again, like the cold-blooded animals, it has a greater tenacity of life, can endure greater disarrangement of its nervous system, and a longer suspension of the function of respiration.

The state of childhood has also its peculiarities. The capillaries bear a much greater proportion to the larger vessels than in the adult. This is the cause of the difference between the diffused bloom of the youthful cheek and

the red lines of an aged countenance. The irritability of the organs of circulation is greater, the heart beats more frequently—at birth twice as frequently—and at all times is easily excited. Still the vital actions of the vascular system have not the same powers of endurance as those of adults have. Hence they are more easily depressed by cold, and by depleting evacuations, particularly blood-letting. Nutrition and absorption go on faster. Thus we see the body grow, and the digestion is more rapid, and food is required more frequently. The nervous system possesses more mobility than in after-life. Objects of sensation are pressed more vividly upon the attention, and make a deeper impression upon the memory. Hence this is the time for education. The power of abstracting the mind, or of continuing long applied to one particular topic, is however less than in mature age. The feeling of voluntary motion is more grateful, inactivity cannot be endured, and greater varieties of combined movements can be performed; but the strength and endurance of muscular motion is less than afterwards. Mental emotions are more easily excited; but they are more capricious and transient than in after-life.

The full size of the body is not attained until, at least in the male, the twentieth or twenty-first year. The brain first attains its full size, being generally as large at seven years of age as it ever becomes. The growth of the extremities would sometimes seem to be produced by a somewhat sedentary life, while active muscular motion, probably by soliciting the flow of the blood to the muscular parts, somewhat retards such. Moderate alternation of temperature favours the growth; but a very cold climate permanently checks it. Thus the inhabitants of the Arctic regions have a much less stature than those of warmer climates.

The muscular system of females is less developed and less powerful than that of males, while the nourishment of the cellular and adipose textures is generally greater. The nervous system differs much from that of man. The sensations of woman are more acute; minute differences of sensations are more readily appreciated; the disposition to active and sustained mental or bodily exertion is perhaps somewhat less; but the mental emotions are stronger, and hence women are more habitually under their control. Their feelings are more disinterested, and their moral sympathies greater and kinder than those of men.

Every human being is sure to be affected by two things—disease and death. He is as sure to be attacked by the former, as the water which falls upon the ground is certain to drain itself into the rivers; and as certain to fall a prey to the latter, as the waters of the rivers will roll on towards the ocean. Of all the beings born into this world, many perish when infants, many others during childhood, and many others are cut off in the full vigour of their manhood. But a minority arrive at that period when full strength, and power, and health have been enjoyed for a term of years. And if they do, certain changes take

place in their constitution and structure; the circulation in the capillaries is confined to those larger ones which communicate with the veins, while the smaller are obliterated; the power of generating heat is diminished; the circulation becomes slow and feeble; the action of the air and blood at the lungs is impeded by the enlargement of the cells of the lungs; nutrition takes place more slowly, and the body begins to waste and bend; the fluids of it diminish, and the textures become rigid; the cornea is flattened; many of the cartilages become bones; the senses are blunted; muscular movement becomes irksome; the power of fixing the mind is weakened; the memory decays; and the mental emotions are less easily excited, and their influence becomes less, until at length the worn-out machine ceases to play, and life becomes extinct.

Thus have we arrived at the close of the first part of our subject—**PHYSIOLOGY**. We have considered the general laws of life, and we have explained, to the best of our power, the manner in which the principal vital actions are performed, and referred them to these general laws. We have now to treat of the laws of death and disease. We pass on to our second division—**PATHOLOGY** and **THERAPEUTICS**.

PART II.

PATHOLOGY AND THERAPEUTICS.

CHAPTER I.

DEATH.

WE have seen that nature requires so many conditions for the continuance of vital actions, that we can easily understand that the temporary suspension of many of them should prove fatal. And the human body is unfortunately exposed to many causes which prevent the vital actions from being performed. Still, however, their fatal effects are always produced by their stopping the circulation of the blood; and this either by suspending the vital actions of the circulating powers, or by preventing the arterialization of the blood; inasmuch as, in the chapter upon RESPIRATION, we found that unarterialized or venous blood could not circulate through the lungs.

Any cause acting upon the system, as a concussion, or strong mental emotion, sufficient to depress the powers of the circulation, produces death; and this mode of dying is called syncope. A common faint is an illustration of this principle, and if not speedily recovered from, this state ends in death. Again, any cause which renders the blood incapable of conveying the requisite stimulus to the heart, by means of which that organ contracts, induces death. Bleeding from extensive wounds, and starvation, for example, will produce death in this manner; and, in such cases, death is said to take place by *anæmia*. Then the arterialization of the blood is prevented by any cause which hinders the access of air to the lungs, as in suffocation. Death happening from this cause, we term death by *asphyxia*. Moreover, if the sensation which prompts us to breathe, as we have seen, by an influence transmitted to the brain from the lungs, where it is excited by the presence of venous blood, be not felt, inspiration ceases, and the blood is not arterialized. This occurs in cases of narcotic poisonings, apoplexy, and other diseases; and death brought on in this way is said to be death by *coma*.

In cases of sudden and violent death, it evidently and clearly takes place

in one of these manners; but in death, occurring after a long illness, it can easily be conceived that more than one cause will bring about the fatal result. But in every disease, the painstaking physician can predict the manner in which life is threatened; and it is to remove the particular tendency to death that exists that his efforts are turned. He possesses means which tend to increase the vital powers of the circulating organs; if death by syncope is threatened, he uses them. He is possessed of means which tend to increase the stimulant effect of the blood; if death is threatened by anaemia, he uses them. He is possessed of means that can sometimes remove many of the causes which, in various diseases, impede the access of the air to the blood at the lungs; if his patient is in danger of asphyxia, he uses them. And he is possessed of means, which are sometimes effectual in restoring the sensation which excites breathing—these he uses in cases of coma. Thus the art of the physician is seen to be very different from the mere memory-work it is by so many supposed to be.

After some violent injury to the nervous system, or strong mental emotion, or any of the causes that produce syncope, the heart's action is either at once arrested, or becomes feeble; the pulse is small, or imperceptible; the skin is cold and damp; and sensation and voluntary motion are destroyed. When examining the heart after death, it is found sometimes quite empty, sometimes distended; but there is no decided difference as to the quantity of blood contained in its right and left sides. Great difference exists among different individuals as to the amount of injury, mental emotion, &c., which will induce syncope, and also as to the facility with which it can be recovered from. After a less amount of injury of the nervous system than produces syncope, or after any of the other causes which produce coma, the breathing is laboured, and the circulation remains entire until the last breath be drawn, and even a little survives the respiration, and only comes to a stand on account of the venous blood entering the arteries; and upon examining the chest after death, we find, as we also do in death by asphyxia, the blood accumulated in the lungs, pulmonary artery, right side of the heart, and the great veins. It is generally attended with insensibility; dilated or contracted pupil; slow and irregular pulse; and frequently by delirium, palsy, convulsions, &c. We know from physiology that the portion of brain affected must be the medulla oblongata, from which the nerves that supply the organs of respiration arise; but the part visibly injured is sometimes at a considerable distance from this.

In many instances, after a concussion, &c., the person affected is in danger of dying from syncope; but recovers from it, and passes into a state of coma. This often happens in a fit of apoplexy, which, we shall afterwards find, depends upon pressure upon the brain, and where the suddenness of the shock induces syncope; although, in a little time, that may pass off, and coma be induced.

Hence the indiscriminate plan of bleeding every person attacked with this disease is highly improper, and often, without doubt, the cause of death.

We may observe that diminution of the pressure to which the brain, or spinal cord, has been previously subjected, brings on a state of syncope. Thus the removal of a piece of bone, &c., which has long rested upon a portion of the brain, brings it on. Fainting, on assuming quickly the erect posture after having been long stooping, after bleeding, and after the operation of tapping, is referable to the same principle.

A sudden and severe blow upon the stomach, sometimes even a drink of cold water when the body is exhausted, induces syncope, which is occasionally fatal.

The effects of intense heat, whether applied to a portion of the body, as in the case of a burn, or to the whole of it, as in a *coup de soleil*, sometimes acts as a concussion, and induces syncope. At other times, but more rarely, and especially in persons of a very strong habit of body, the blood would seem to be expanded, and to press upon the brain, and thus bring on coma. Lightning, or electricity, when fatal, induces syncope.

Intense cold may and has acted upon the body in the manner of a concussion, and brought on syncope; but generally, from the diminished flow of blood to the surface, a larger portion than usual is sent to the nervous centres, and the pressure thereby excited causes coma. From the peculiar effects of intense cold upon the circulation of the capillaries of the surface, it has been found that the power of subsequently generating heat is diminished in a part exposed to intense cold. In a frost-bitten part, if its vital powers be not at once destroyed, the return of warmth excites an inflammation, which, from the enfeebled condition of the part, runs on to mortification. This is to be moderated by causing the restoration of the part to take place very slowly; which is done by the application of cold substances, generally snow, to it.

Poisons produce death in all the manners in which it can take place. Various gases, such as carbonic acid, for instance, excite such violent spasms that the top of the larynx is closed, and no air entering the lungs, death by asphyxia comes on. The narcotic poisons, such as opium, alcohol, the woorali poison, &c., bring on coma; but many of them, particularly opium, have often a decidedly depressing effect upon the circulation. Hence the records of medicine contain but one case in which the artificial respiration was successful in a case of poisoning by this last-mentioned drug. Prussic acid, the infusion of tobacco, and many other poisons, act upon the heart, and bring on syncope. Other poisons excite inflammation of the stomach and bowels, which may prove fatal in the manner we shall afterwards have occasion to see.

The fatal mode of action of hemorrhage, or bleeding, depends upon whether it be sudden or gradual. If gradual, we have every indication of failure of the circulation. The muscular action becomes feebler and feebler; the face

becomes pale, and has that peculiar expression that goes by the name of collapse; cold sweat is seen upon it; the pulse becomes weaker and weaker, and may cease altogether, while consciousness and the intellect remain unimpaired up to the very last moment. This very gradual syncope is still better seen in many diseases in which the heart's action is sympathetically affected. In cases where the hemorrhage is more violent, the system is affected as by a concussion, owing to the diminished pressure of the brain. In such cases we have delirium, or insensibility, nausea, vomiting, and more or less of spasm, or convulsion, before death ensues.

Repeated losses of blood have upon many constitutions, particularly upon women and children, a very curious effect. A high degree of excitability of the vascular system is produced, and the heart's action is increased in frequency, and apparently in strength, while the other vital functions are imperfectly performed. This state of the system is denominated reaction after the loss of blood, or prostration with excitement. This state is of very great importance in disease, and often deceives the unwary practitioner, by inducing him to adopt depleting measures, which prove fatal.

We formerly incidentally alluded to death by fasting. The essential mode of death, in this case, is the same as in the gradual abstraction of blood; which indeed it is; and, therefore, by syncope. There is, however, in addition, an inflammatory state of the mucous membrane, with fever, which induces slight comatose affections. After long abstinence, the power of absorption is almost entirely lost; and this is probably the reason why, after it, a large quantity of nutriment is injurious.

In the majority of cases of strangulation and drowning, in *burking*, in certain injuries of the chest, pressure upon the surface or wasting of the lungs, and in all the various modes in which air is prevented from permeating the structure of the lungs, death takes place by asphyxia. In all these cases, deep and laboured attempts at respiration are made: the surface, and especially the lips, become livid; and when life is speedily destroyed in this manner, the countenance assumes an expression of anxiety and horror which it is impossible to describe. Next comes on insensibility, during which state there are spasms, which are supposed to be induced by some venous blood which has been carried through the lungs reaching the brain. After this the attempts at respiration become irregular, and then cease. Upon examining a body which has died in this manner, we find the left side of the heart empty, but the right gorged with blood. It has been found, by experiments upon animals, that the heart has the power of contracting after death in cases of this kind; and hence resuscitation from this kind of death has been known to have taken place by using the artificial respiration, even some minutes after the pulsations of the heart have ceased.

CHAPTER II.

DISEASE IN GENERAL.

EVERY one knows that the various functions and actions which we have had occasion to notice when considering the physiology of the human body, are not invariably performed in the manner in which we have described them to be. Deviations from the natural state take place, and cause suffering or inconvenience, or endanger life. These deviations we style Diseases. They differ from the effects of injuries, inasmuch as they frequently originate without any obvious cause, and are not always excited when the causes which do produce them are applied. Moreover, they always consist of a series of changes, or symptoms, which usually do not commence until some time after the cause has been applied, and last for a length of time after it has been withdrawn.

All diseases may be divided into two great classes; those attended with fever or excited circulation, hot skin, thirst, &c.; and those which are not: in other words, the febrile and the non-febrile. The febrile diseases consist of two great classes; the inflammations and the fevers proper. The inflammations have two divisions; the acute and the chronic, and also simple and specific: the latter term being applied to certain inflammations, whose effects are specifically distinct from those which result from the more usual form. The fevers have three divisions: intermittent, in which there is an interval of freedom from the disease, and of which ague is an example; the continued, where none such is to be seen; and the eruptive, which are attended by a rash or eruption of the skin. The non-febrile diseases have also important divisions. Sometimes, in consequence of previous diseased action, there is some obvious change in some tissue. To this the name of organic disease is applied, while in other cases, where no such change exists, we use the term functional. Then, organic diseases may be again divided into simply organic and malignant, the latter term being used when not only an organized structure has undergone a change, but when a substance not found in the healthy body has been formed in it.

With regard to the mode of action in which fatal diseases produce death, we may observe that, generally speaking, the acute diseases of any internal organ act much in the same manner as an injury of the same part would do. Thus, in acute diseases of the head, we are threatened with coma; in those of the chest, with asphyxia; and in those of the abdomen, with syncope, from the sympathetic affection of the heart. In chronic disease, the fatal result may

occur in the same manner, but very often it is to the injury done to the function of assimilation that it is to be attributed, and therefore this resembles death by starvation. Sometimes death is to be attributed to the retaining of an excretion, which acts as a poison, or to the formation of a poison in the body, and principally affecting the fluids. We have examples of the former in certain diseases of the liver and kidney, and of the latter in fevers.

We have next to observe that all disease has a strong tendency to a spontaneous favourable termination. It is from not sufficiently attending to this, that so much exaggerated value is often placed both upon proper and improper treatment. The effects of most of the external causes of disease are naturally transient, and the diseased action produced by their presence ceases soon after their withdrawal. Besides, we shall afterwards have occasion to see, that in many diseases provisions are naturally made, which tend to promote a cure, or which set bounds to further diseased action. But, in addition to these facts, there undoubtedly exists, in almost all morbid action, a strong tendency to pass into a state of health—a tendency which we cannot explain, and which, therefore, we can only state as a fact.

The existence of disease is made known to us by the presence of symptoms. These are of various kinds, but they may be arranged into three classes: first, uneasy, unnatural, or impaired sensations; secondly, disordered or impeded functions; and lastly, alterations of the structure, or of the appearance, of a part. These last are often called physical signs.

The most important of the altered sensations is pain. This occurs in almost every inflammation, and in many other non-febrile diseases. Its character varies in different diseases, as we shall afterwards have occasion to see, and also in different textures. Epithets are given to these varieties of pain, and convey distinct enough notions of them. Thus we hear people speak of burning, shooting, gnawing, tearing pain. Pain, too, differs, or at least is differently complained of, in different individuals. In nervous people, and in hypochondriacs, it would seem that the pains they often so pathetically allude to, depend in a great measure upon the degree of attention which they pay to their sensations. When pain is only felt at a part when pressed upon, the name of tenderness is applied to it—this is a modification of pain which it is very important to keep in mind. We formerly had occasion to allude to *sympathetic* pains.

Besides pain, there are other altered sensations. Thus itching and tickling in the throat, and tingling and pricking, are often present in disease. Nausea is often an important symptom. Giddiness is a symptom of disorder of the brain or stomach. A peculiar sensation, referred to the pit of the stomach, and called sinking, is often found in stomachic and nervous diseases, and sometimes is complained of by persons about to die in the way of syncope. We must add to the list, the various depraved conditions of the organs of sense and the appe-

tites, and also those feelings described as sensations of weight, tightness, fullness, drowsiness, &c.

Disorders of function are still more important as symptoms. Disordered functions of the brain and nerves are identical with altered sensations. Deprivation of the sense of touch, or numbness, is a very important symptom, as indicating disease or disorder of the brain. We need make no remarks here upon blindness and deafness. The noise called singing in the ears, and also the various other sounds which occasionally annoy people, are present in many affections. The black specks seen floating in the air, or *muscæ volitantes*, sometimes pester dyspeptics exceedingly. Delirium is often a very distressing symptom. Alterations of the power of voluntary motion are very remarkable. Sometimes, as in mania, this is wonderfully increased, but generally debility is complained of in sickness. When it is partial, it is called palsy, and commonly indicates very serious damage done to the nervous system. Spasm is another alteration of the power of muscular contraction; occurring in the calves of the legs it is called cramp, and is one of the symptoms of cholera. The frightful spasms of tetanus, the convulsions of hysteria and epilepsy, the twitching of St. Vitus' Dance, are other examples of this perversion of the power of motion. Akin to spasm is tremor, a very important symptom.

The functions connected with the organs of respiration are in disease much altered, and afford valuable symptoms. We may instance difficulty of breathing, or dyspnoea, and cough. Some, still more important, are derived from the sounds of the chest. These we shall afterwards consider.

Every one is familiar with the fact, that physicians are in the habit of drawing symptoms from the pulse. Sometimes this is too fast, sometimes too slow; sometimes irregular, and sometimes, although irregular, regularly intermitting. Still more useful are the indications to be drawn from its force and degree of compressibility. To its differences in this respect are applied the terms full, soft, hard, small, and wiry.

From the state of the tongue, deductions are made relative to the organs of digestion. Wasting, and very many other symptoms, might be here mentioned, but it is unnecessary to do so, as we shall be obliged to notice them when treating of the diseases in which they occur.

CHAPTER III.

THE CAUSES OF DISEASE.

THE living body, in certain cases, becomes diseased without any apparent cause; but, in the majority of cases, we are able to trace distinctly certain antecedent events, which we are justified in pronouncing to be the causes of the morbid actions. So many causes, which are or are supposed to be sufficient to induce disease, are so often found existing around a person who is afterwards attacked, that very great caution is requisite in deciding upon the actual cause. So far, however, from this part of medicine being more generally and carefully attended to, it has been the most neglected, and the most illogically considered of all the various subdivisions of the science. This is the more to be regretted, inasmuch as many of the causes of disease are known to be removable; and thus, by carefully studying and appreciating them, much suffering and pain, both physical and mental, might be got rid of.

The causes of disease have been divided by writers upon the subject into three classes—the predisposing, the exciting, and the proximate. This last, however, is merely the expression of the condition of that part of the body from whence the whole train of morbid symptoms flow. However correct, therefore, the expression may be, we shall here merely consider the exciting and predisposing causes. These terms require little explanation. Certain causes excite certain diseases; but not invariably. A predisposition to take the disorder is requisite. Thus, exposure to cold, or wet, brings on catarrh, or a cold, as it is usually, from this very circumstance, termed. Damp, then, is the exciting cause of a cold. But of twenty people exposed to the same amount of damp, only a portion are affected with cold; nay, the same amount of exposure in the same individual, sometimes induces and sometimes does not. There must, therefore, in these cases, when the catarrh comes on, be some predisposing cause in operation. Or, to take another example, fever is brought on, in the majority of cases, by contact with or close proximity to people suffering from an attack of fever. Contagion, then, is the exciting cause of fever. But of a number of people who approach fever patients, only some catch the contagion. Practically speaking, we find that those who do, have been suffering privation for some time previously. We say, therefore, that poverty is a predisposing cause of fever.

The most important of the predisposing causes of disease are—

First, The hereditary tendency. The transmission of peculiarities of constitution from the parents to the offspring is undoubted. We have daily instances of this in the transmission of family likenesses. Some of these are very remarkable. Our own Royal Family present several striking instances of this resemblance of physical structure. Many authenticated cases are on record, too, in which certain peculiarities, such as additional fingers or toes, or webs between the fingers or toes, have existed in the same family for generations. Mental qualities are, in like manner, often transmitted to children, although the effect of training and education is such that they are never so distinctly marked as physical peculiarities. One very curious fact relating to this subject is, that these peculiarities may disappear for one or more than one generation, and yet make their appearance in a third. Now, just as structural appearance and peculiarities, and as mental qualities are hereditary, so also are there some diseases, a predisposing tendency to which is, in like manner, transmitted from one generation to another. The most striking of these are scrofula, gout, asthma, epilepsy, and insanity. To these we may add gravel, diabetes, and diseases of the large arteries. Medicine possesses no powers of removing this hereditary predisposition; and the proposal which has been made of people being careful not to marry when the two families have the same hereditary tendencies, is chimerical and impracticable; but it has powers of preventing the exciting causes being brought into contact with an individual so disposed, and of fortifying the constitution against them.

Secondly, Many causes are often observed to predispose to disease, and which, as their mode of action is evidently the same, can be classed together, although the influence they practically exert is very different in amount. Their effect is to enfeeble the vascular system, and to render the nervous system more susceptible of impressions from without. They thus predispose the body to become disordered from the application of exciting causes, which might otherwise be innocuous. They may be classed into two divisions: those which are the causes of deficient excitement, and those which are the causes of excessive excitement. Of the first of these are imperfect nourishment, *i. e.* not so deficient in quantity and quality as to bring on starvation, but not sufficient to maintain a full state of health, and deficiency of the natural stimuli of pure air and muscular exercise. It is to be observed, that in a practical point of view, it is impossible to say which it is of these two latter causes that exerts the most injurious influence; most probably it is the want of exercise. To these we must add long-continued cold, excessive loss of blood, depressing passions of the mind, and previous debilitating disease. Of the second class are excessive exertion, either bodily or mental, with too little relaxation, and especially with too little sleep, long-continued heat, and drunkenness.

That all these causes act, and to a large extent, is amply proved by observation upon the much greater amount of disease in times of scarcity of food, or of want of employment among the poorer classes, than among the more affluent; among the poorer classes of very hot or very cold climates, than among the richer in similar circumstances, but who are more habitually protected from extremes of temperature; among the poorer inhabitants of crowded towns, than among agricultural labourers; among convalescents from disorders, than among those previously healthy; among the intemperate, than among the sober; and among depressed and disheartened men, as in a beaten army, than among more fortunate individuals, as, for instance, in a victorious one. All this shows the importance, in preserving health, of a tonic regimen, consisting of a nutritious diet, good air, moderate exercise, mental excitement, and alternation of temperature, *i. e.* the occasional exposure to a moderate degree of cold. It is now well known that the mortality of the poorer classes of our large towns is an immense deal greater than that of their equals in rank in the country, while that of the richer in the towns is less than that of the poor in the country; and, accordingly, it appears certain that no circumstance so uniformly increases sickness as destitution.

Some of these causes predispose to diseases of particular organs; heat to those of the liver; excessive mental exertion to those of the brain; violent mental emotion to those of the heart, &c. Others would seem to predispose to particular inflammations, as the air of low, damp, and crowded habitations does to the scrofulous one. But no organ, or texture, is uniformly affected by any of these causes.

Thirdly, An opposite state of the system to that induced by these causes predisposes to some diseases. This is general plethora, and is produced by too high living, and want of exercise. Gout and apoplexy are the diseases most frequently predisposed to by this cause. A state of partial plethora also predisposes to inflammation of the parts in such a condition. Thus glands, when their secretions are more than usually abundant, are unusually apt to have disease excited in them. The tendency of the breast of a nursing female to become inflamed is an instance of this.

Fourthly, Another frequent and powerful predisposing cause is the existence of previous disease, and, especially, previous inflammation. Disease is much more readily produced in an organ which has been before affected, than in one which has always remained healthy; and this is particularly true of affections of the nervous system.

Fifthly, Organic disease predisposes to other diseases, partly by reason of the quantity of blood which it abstracts from the system acting as a debilitating cause; but still more by obstructing the circulation, favouring local congestion of the blood, and thus tending to inflammation and effusion of the serum of the

blood. These effects are principally seen when we trace the consequences of organic diseases of the heart, lungs, kidneys, and liver.

Lastly, We must remark that one great predisposing cause to disease is popular ignorance. There can be little doubt that the amount of mortality among infants, in especial, depends upon their systems being weakened by unintentional, but improper, treatment and regimen.

None of the exciting causes of disease, with the exception of mechanical violence, uniformly, and with absolute certainty, produce it. There is an essential difference between those exciting causes to which the human body is often and necessarily exposed, and those which have a temporary and local influence only. Sporadic diseases arise from the one, and plagues, or epidemics, from the other.

Of the former class of exciting causes of disease we may enumerate mental emotion, which sometimes augments the flow of blood to the head, but which has a more extended effect in modifying the secretions, particularly those of the alimentary canal; excess in eating and drinking, which injures the secretions of the stomach and bowels, and stimulates the circulation, so as to determine local congestions of blood; and the sudden suppression of accustomed evacuations, which also stimulates the circulation. But the most important of these exciting causes of disease is the alternation of temperature, or the application of external heat, in such a degree as to irritate the part to which it is applied, or to impress violently the nervous system; and of external cold, so as to affect powerfully the nervous system. The diseases excited in this manner by cold are those of internal organs; for it is to be observed, that cold merely acts, at least in ordinary circumstances, upon the surface, as a predisposing cause; and the diseased actions which take place upon it, after being exposed to cold, are owing to, and excited by, the restoration of temperature.

The morbid action which is excited by cold in the body depends upon the sensation experienced from it; and the more acute and lasting this sensation is, the greater are the effects resulting from it.

The effect of very intense cold is a strong inclination to sleep, which, if indulged in, terminates fatally, in the way of coma. A very well-known illustration of this is the adventure of Sir Joseph Banks and Dr. Solander, with their attendants, in their botanizing excursion, met with among the hills of Terra del Fuego. It is described in Cook's Voyages.

A moderate degree of cold, provided its application only last a short time, so far from being injurious, is actually beneficial, invigorating both the mind and the body, and, indeed, is a very important curative agent.

Nevertheless, there is no doubt that cold is the most common exciting cause of complaints. "With the exception," says Dr. Bateman, in his observations upon the Diseases of London, "of a small number of diseases occasioned by

unwholesome occupations, and by the contagions, the great mass of human malady in this metropolis is referable to the climate, or state of the seasons, and to intemperance; but of these two causes, the vicissitudes of the weather, especially its cold, are by far the most prolific sources of mischief." It is therefore very important to ascertain the circumstances under which cold exerts its greatest influence over the body, and is most prejudicial.

It is not the intensity of the cold that produces the mischief. It has been usual to say, that it was to the suddenness of the change that the danger was attributable, and that a previous hot state of the body augmented it. This, however, is not strictly correct. It is well known that the Russians are in the habit, immediately upon leaving the vapour bath, to roll themselves upon snow, and that they do this with perfect impunity. Captain Scoresby mentions, that he was in the habit, when in the Arctic regions, of leaving his warm breakfast-room, where the temperature was fifty or sixty degrees, and ascending to the mast head, where it was only ten, without any additional clothing, save a cap, and this without any bad result. In fact, instances similar in principle happen around us every day. As long as the power of generating heat is active in the body, then exposure to cold does no harm; but when, from fatigue or any other cause, that power is lessened, then the application of cold is followed by bad consequences. Therefore it is more correct to say, that cold is dangerous, not when applied to the hot body, but when the body is cooling after having been heated. A bather, therefore, on a hot day, had better not wait by the river side to cool, but at once plunge into the water: and wet feet or clothes produce no ill effects as long as the power of generating heat is kept up by exercise, but are very injurious as soon as the exercise ends, particularly if the individual be fatigued.

We can easily understand that any cause which diminishes the activity of the circulation, and therefore the animal heat, disposes the body to be more readily affected by cold. Hence the evil effects of cold are much more readily produced during sleep than during the waking hours. This is a very familiar fact. It may seem to contradict the assertion we just made, that the evil effects of cold are proportionate to the sensation excited. But there is little doubt, as we before said, but that the sensation of cold is felt during sleep, and influences the dreams. This is very graphically illustrated by Lord Brougham, who, we presume, describes his own experience. He says, "Every one knows the effects of a bottle of hot water applied during sleep to the soles of the feet. You instantly dream of walking over hot mould, or ashes, or a stream of lava, or having your feet burnt by coming too near the fire. But the effect of falling asleep in a stream of cold air, as in an open carriage, varies the experiment in a very interesting as well as instructive manner. You will feel, indeed instantly, that the wind begins to blow; dream of being upon some

exposed spot, and anxious for shelter, but unable to reach it; that you are on the deck of a ship, suffering from the gale; you run behind a sail for shelter, and the wind changes so that it still blows upon you; you are driven to the cabin, but the ladder is removed, or the door locked. Presently you are on shore, in a house with all the windows open, and endeavour to shut them in vain; or, seeing a smith's forge, you are attracted by the fire, and suddenly a hundred bellows play upon it, and extinguish it in an instant, but fill the whole smithy with their blast, till you are as cold as upon the road."

Any cause which deadens the sensation of cold, fortifies the body against its bad effects. The attention being strongly fixed upon one object does this, as we sometimes see take place in those affected with asthma, who will remain for hours at an open window, in a frosty night, with merely night-clothing on, and yet suffer nothing from the cold. Madness, still more effectually, protects its unfortunate victims. "I have seen," says Currie, "a young woman, once of the greatest delicacy of frame, struck with madness, lie all night on a cold floor with barely the covering that decency requires, when the water was frozen on the table by her, and the milk that she was to feed on was a mass of ice." The power of habit has great influence in protecting the system from the bad consequences of cold. This we see illustrated by observing the different manner in which an inclement temperature is borne by shepherds, sailors, agricultural labourers, and the like, and clerks, shopmen, teachers, &c. Almost every person, too, can harden himself in this respect, and it is a very important matter to attempt to do this—always of course within reasonable bounds—in children. One of the most effectual means of accomplishing this, is the daily use of the cold or tepid bath. If the glow of heat come on very soon after leaving the cold bath, then we conclude that it is agreeing with the system; but if chilliness and uncomfortable feelings follow its use, then we know that the tepid bath will be preferable.

We may observe, that the injurious effect of cold is augmented when it is applied by a wind, or current of air, and still more so when it is accompanied with moisture or dampness. In both these cases, the sensation of cold is increased and prolonged.

The influence of alternation of temperature upon disease is very clearly shown by considering the rate of mortality, and the kind of diseases prevalent at the different seasons of the year. Dr. Heberden, half a century ago, wrote two very interesting papers upon this subject, and his assertions have since been amply confirmed. From the bills of mortality, he found that the number of deaths was greatest in January, February, and March, and least in June, July, and August; evidently, in a great measure, arising from the difference of the temperature of these two quarters of the year. He further remarked, that the winter of 1795 was the coldest of any of which an account had been kept. In

the January of that year, the average of the thermometer was at twenty-three degrees in the morning, and about twenty-nine and a half in the afternoon. The same month, in the following year, was as remarkable for its mildness, the thermometer in the morning averaging forty-three degrees and a half, and fifty in the afternoon—the average difference between the two months being over twenty degrees. Now the number of deaths in the five weeks, from January the first, 1795, was no less than two thousand eight hundred and twenty-three; while in the corresponding five weeks of the warm 1796, there were only one thousand four hundred and seventy-one, the difference between the two being most enormous—actually one thousand three hundred and fifty-two. The classes of people in whom the injurious effects of the severe weather were most felt, were also ascertained. The increased mortality was chiefly among the very old and very young; just those among whom the power of generating heat is feeblest. In January, 1795, seven hundred and seventeen people above sixty died, while, in the next January, only one hundred and fifty-three.

The mean temperature of the air in London is fifty degrees and a half, and it has been observed, that as the mean temperature of the day and night sinks under this point, so, and in exact proportion, does the mortality increase. Nothing could more strongly illustrate the great influence which cold has in exciting disease than this fact.

The principal diseases induced by cold are the various inflammations, particularly of the thoracic viscera, acute rheumatism, palsy, and apoplexy; while heat causes disorder of the digestive organs.

We have now to consider those exciting causes of disease which act only at certain times and places, although often with great virulence, and upon large numbers. There is a class of diseases excited by substances taken into the system, or formed in the system, from the want of proper aliment, which act, although very slowly, after the manner of poisons. Scurvy is one of the most striking examples of this class of diseases; and as a correct knowledge of its causes has led to its perfect annihilation in this country, we beg to call our reader's attention to it in a particular manner.

Scurvy is a disease which used to commit the most dreadful ravages in our fleets. Nor was it confined to them, it also prevailed to a very great extent upon shore. A couple of centuries ago, it was endemic every spring in this as well as the northern countries of Europe; and in long sieges, and seasons of scarcity in general, it frequently became epidemic. A great change has taken place in the habits of the people of this country with respect to food. Until the commencement of the sixteenth century, no edible root of any kind, or any salad, was grown in England; and, of course, when they were introduced, their use was gradual. The rich used sometimes to import a small quantity of vegetables from Holland. Queen Catherine, the first wife of Henry the Eighth,

when she wished a salad, was obliged to despatch a messenger thither on purpose. Dr. Budd, as illustrative of the great change which has taken place in the diet of people in this country, states that he has in his possession an account-book, bearing date the latter half of the last century, and that for a long period the price of a peck of potatoes was two shillings, and a quarter of a sheep sixpence. The gentleman who gave him the account-book, and who was more than seventy years of age, told him, that when he was young, no potatoes were kept for winter use, and that during that season the only vegetable was a coarse kind of kale, which was tough and unpalatable. During, in fact, three or four months of the year, the ordinary food consisted almost entirely of meat, bread, and flour puddings.

Now, among people using, for a length of time, this kind of diet, *i. e.* a kind with no fresh vegetables, scurvy is very common. It has even of late years sometimes shown itself. Our troops at the Cape of Good Hope, in 1836, were without vegetables, and scurvy made its appearance among them. It has also occasionally made its way, and from the same cause, into our prisons. But its effects have been felt most severely at sea. Vasco de Gama, when he doubled the Cape of Good Hope, lost by it a hundred men out of a complement of one hundred and sixty; and the records of the adventurous voyagers who succeeded him, present frightful pictures of the fatal extent to which this disease prevailed. "With such infection," says one of them, Carter, "did the sickness spread in our three ships, that about the middle of February, of a hundred and ten persons that we were, there were not ten whole; so that one could not help the other—a most horrid and pitiful case. Eight were already dead, and more than fifty sick, and, as we thought, past all hope of a recovery. In such sort did the sickness continue and increase, that by the middle of March there were not above three sound men left. Twenty-five of our best men had died, and all the rest were so ill that we thought they would never recover again." In the first voyage for the establishment of the East India Company, out of four hundred and eighty men, a hundred and five died of scurvy. In the commodore's ship, however, there was no scurvy at all, and it was remarked that his men had served out to them each day three table-spoonfuls of lemon juice. Of the extent to which it proved fatal in our navy, some idea may be formed from the assertion of Sir H. R. Hawkins, who declared that, in his twenty years' service, he could give an account of ten thousand sailors who had died of scurvy; and the statement of Dr. Lind, that during the war which terminated in 1748, the scurvy destroyed more men than the united efforts of the Spanish and French arms. Its destructive effects were, perhaps, most frightfully seen in the expedition of Admiral Hosier, who buried two successive ship's companies, and himself died of a broken heart in consequence. Various opinions were formed of the causes of this frightful disease, and very similar

loose opinions were entertained of its connection with impurities of the atmosphere, from want of cleanliness and ventilation on board ship, as now are of the connection between the same impurities and fever.

Captain Cook, however, proved that the causes of scurvy were removable. He sailed round the world in all climates, was absent from home more than three years, and lost only one man by disease. Twenty years after his return, the government were convinced that the cause of sea-scurvy was the want of fresh vegetables. Accordingly, orders were issued that a regular supply of lemon juice should be given to each seaman on board the royal navy. The effect of this was almost miraculous, and the diminution of sickness and deaths in the navy was almost in the proportion of four to one; and now the disease is perfectly unknown in our marine.

We have dwelt upon this, because it affords such a striking instance of the vast importance of attending to the causes of disease, with a view to diminishing disease and lowering the rate of mortality.

We say, then, that the exciting cause of scurvy is a poisonous state of the system, produced by the absence of fresh vegetables. The use of spurred rye as ordinary food engenders a poison in the system, which excites a peculiar form of inflammation in the extremities, having a rapid tendency to end in mortification. Something similar has been known to follow the use of some kinds of German cheeses and sausages. Certain inflammations and irritations of the skin are produced in some individuals by various articles of food, as, for example, by mussels. The gradual introduction of lead into the system, as often happens to house-painters, brings on a peculiar kind of colic, which is subsequently followed by a peculiar palsy. Excess of alcoholic drink sometimes brings on the dreadful disease called delirium tremens.

There are other diseases confined to certain localities, supposed to be excited in the same manner. Thus we have the Derbyshire neck in Derbyshire and other hilly countries, cretinism in Switzerland, guinea worm in Africa, elephantiasis in Egypt, &c. &c.

Moreover, there are other diseases of even more practical influence over the public health, because at certain times they are much more general and prevalent, which we likewise ascribe to certain poisons received into the system at the lungs. It is true that we have never been able to make the poisonous matter appreciable to our senses; but we have many reasons for presuming its existence.

The diseases produced in this way are those which prevail epidemically—that is, in certain districts and at certain times; while other countries, and the one affected at another time, are perfectly free from them. These epidemic diseases are one great cause of the higher mortality of large towns compared with country places; and their causes are, therefore, very interesting and important.

The fact of these diseases being unknown for a length of time in a community, then prevailing extensively, and then disappearing, proves that their causes are local and temporary. Experience has taught us that the origin of the poison is to be looked for in one of two sources; either in certain effluvia arising from the earth, or in exhalations from the bodies of persons previously affected with the same disease. In other words, these diseases usually arise from *malaria*, or a *contagion*.

It must be confessed, however, that there are some diseases which prevail epidemically, and which do not seem to be propagated in either of these manners. The Asiatic cholera must be placed in this category. It seems to possess a certain degree of contagion, but certainly nothing like sufficient to account for its extension; and it appeared in all kinds of places, damp, dry, high, and low, and therefore was owing to no malaria. It is usual to refer its progress to a peculiar constitution of the atmosphere. This is, however, a rather vague expression, and does not convey a very definite meaning; and it may be doubted if the term be correctly applied.

We judge that an epidemic arises from a malaria, when we observe that the disease is found to prevail within certain limits only—all persons who avoid the locality escaping the disease, although in every other respect, but situation, they are precisely similarly circumstanced. Besides, no precautions for the separation of the sick from the healthy in these affected districts, has any influence in stopping the disease; while the removal of the sick to another locality in a great measure arrests the disorder, and never communicates it to those round about the sick men. Moreover, generally, these localities agree in containing water which has been long stagnant.

Malaria can, in a great measure, be destroyed, and has been destroyed, by draining and cultivation; and its effects may often be avoided by taking advantage of certain peculiarities regarding its diffusion. These we shall more fully describe when we have to treat of intermittent fever, or ague, a disease undoubtedly produced by malaria.

An opinion has always found some supporters, and has of late been revived by Drs. Arnott, Kaye, &c., that the origin of the common typhus, or continued fever, of this country is a malaria, that arises from putrid animal and vegetable matter, and which is owing to ill-ventilated houses, bad sewers, and the like. This opinion is recommended to be adopted by the legislature. When we speak of continued fever, we shall examine this question pretty minutely. Here we merely observe, that we do not think that any adequate evidence, nay, we doubt if any evidence at all, has been adduced in proof of this theory.

We judge that an epidemic is propagated by a contagion, when we find that those who are known to have had communication with the sick, are affected with it in a much greater proportion than those who have not; and when we

see that the only common apparent source of the disease existing among the sick, is previous communication with sick people, and the only common cause of exemption found among those who have not the epidemic is non-communication. Thus we find, that, in the midst of an infected district, absolute seclusion from those affected produces complete immunity to families, and to the inmates of schools, barracks, hospitals, and the like; and if the sick are carefully separated from the healthy at the commencement of the epidemic, and all substances, to which exhalations from their bodies can have attached themselves, be purified, the extension of the disease is diminished, or even altogether stopped. Moreover, we can, in almost every instance, discover in any single attack, the time and the place, the where and the when, that the person so attacked touched, or was near, some previously affected person.

The reason that only a portion of a community is attacked by an epidemic is, that, as we before mentioned, no morbid cause uniformly produces a disease; and that, moreover, the disease to be produced requires, not only an exciting, but a predisposing cause.

The principal diseases propagated by contagion are, the continued or typhus fever of our own country, small-pox, chicken-pox, scarlet fever, measles, plague, dysentery, influenza, erysipelas, itch, hydrophobia, &c. The accuracy of the statement, that all these are contagious diseases, is confirmed by the fact, that many of them can actually be transferred from one person to another by inoculation. The peculiar contagious poison of hydrophobia is never communicated to man, and probably not to animals, in any other manner.

In considering the different diseases, we shall have occasion to state many facts relative to malaria and contagion. At the risk of anticipating something of them, and of repeating former statements, we think it best to call our readers' attention to a few of the general laws of these exciting causes of disease.

The great predisposing causes to them, we may first remark, are such as diminish the force of the circulation. This we can readily understand, when we remember that absorption of anything is remarkably favoured by that condition of the body. We may add, that the great actual cause of this diminished circulation, (in Great Britain and Ireland at least,) is the various states of the system, brought on by poverty in some form or other. Hence, after a slackness of trade, a strike, the high price of provisions, &c., we are sure to have an epidemic. On the other hand, the effects of these exciting causes are diminished by a previous state of fulness and excitement of the vascular system; and we know, from physiology, that such a state greatly diminishes the power of absorption.

None of these exciting effects act with uniformity, epidemics varying very much in character and malignity, and this for reasons unknown to us.

It is a remarkable fact, that both malaria and contagion are often aided in

their effects, not only by the predisposing causes of disease, but also by other exciting causes, particularly by cold.

Then the tendency to all these diseases is very differently modified by previous attacks. The diseases arising from malaria are more easily excited after having once existed; while those arising from contagion are less easily excited when once they have happened in an individual. In the measles, scarlet fever, and small-pox, one attack in general gives perfect immunity for the future; and in the case of the latter, it has been discovered that the contagious poison that produces it undergoes a change by being passed through the system of a cow, whereby the disease is rendered milder, and is still capable of being communicated to man, and that this mild form gives security to most individuals against the virulent attack. Even in those cases where a person, after having been vaccinated, as the term goes, takes small-pox, its malignity is lessened, and nearly always completely destroyed.

CHAPTER IV.

THE ACTION OF REMEDIES.

A KNOWLEDGE of the efficacy and action of remedies is obviously of the last importance. Unfortunately, however, the influence of remedies over disease is discriminated with very great difficulty, and there is a natural tendency to exaggerate their good effect upon the part of both patient and physician. This difficulty is principally owing to our overlooking the natural tendency of disease to go on to a spontaneous cure, and to our attributing any improvement that may take place to our own interference instead of to nature. It requires great discrimination, too, to decide upon the agent that has actually been useful, when improvement does happen consequent upon the employment of remedies. The improvement in the general health, for instance, which often takes place when tonic medicines are given, and change of scene is also recommended, is owing, in the majority of cases, to the change of air, and not to the bitters, to which it is often, however, attributed. It is from inattention to these two facts, that the treatment of disease, by quackery, appears to be successful. But we must also remember that recovery from disease, when the patient is regularly treated, in some cases at least, depends upon the same causes.

There is, however, no doubt but that there do exist remedies which, if skilfully employed, cure or assist to cure disease. In investigating their utility,

we multiply, as much as possible, the individual cases in which a remedy is given, ascertain if benefit almost invariably follow its employment, and watch if there is an alteration for the better, which does not occur in similar cases where it is not given. We also observe the effects produced by its use during health; and, considering the morbid changes going on in diseases, reason as to its possible use in effecting these changes. Thus, for example, we know that a dose of ipecacuanha excites vomiting. A person is suffering evidently from indigested and indigestible food lying upon his stomach; we therefore have reason to expect that, in this instance, benefit will follow the use of a dose of ipecacuanha.

From the regulations and customs of this country with regard to medical practitioners, infinitely too much medicine is given, and the terms *remedies* and *drugs* have become synonymous. Any cause which can produce a change for the better in a disease is a remedy, whether it be a drug, or a mental emotion, or anything else.

The scientific manner of using remedies is, when pain or uneasy sensations are present, to administer such as possess a sedative power; when certain morbid actions are going on, to administer such as reason and experience show have the power of altering or suspending these; and if life is threatened, to exhibit such as produce a state in the system opposite to that particular way in which we see death is approaching.

There are a few medicines whose good effects cannot be referred to any general principle, but which, undoubtedly, cure diseases. Such are called specifics. The principal of them are, Peruvian bark or quinine, which cures ague and other intermittent diseases; sulphur, which cures itch; colchicum, which cures gout and rheumatism; and iodine, which also often cures rheumatism and inflammations of the periosteum and skin.

The non-specific remedies may be arranged into five classes: those which act on the circulation, on the secretions and excretions, on the nutrition, on the constitution of the blood, and on the functions of the nervous system.

Of those which act on the circulation, we will first notice those which excite the heart's action, and cause a more complete and rapid flow of blood through the body. These are stimulants and tonics. Stimulants, as wine, spirit, ammonia, external heat, various substances applied to the surface of the body, excite for a time the heart's action, and are, therefore, often very useful when life is threatened, as it often is by asthenia or syncope. The effect of stimulants is transient, and often followed by depression; but the stimulating effect of wine is less transient, and followed by less depression than that of other stimulants; and hence, by prescribing it in small and repeated doses in acute diseases that are attended with much debility, we can often avoid any depressing effect, and keep up a constantly stimulated state, until the depressed period

of the disease is over. Tonics are thought to act in like manner; but their exciting powers on the circulation are less active, though more permanent. They are, therefore, applicable to chronic diseases attended with debility, and to the convalescence from acute ones. There is no doubt of the effect on the circulation of nutritious diet, active exercise, pure air, mental activity, and a moderate application of cold; and this tonic regimen and its utility is, in many cases, obviously increased by the use of certain medicines, principally derived from the bitter vegetables and the mineral kingdom.

Other remedies possess an opposite or depressing effect on the circulation. Such are tartar emetic, colchicum, foxglove, &c. They produce nausea, and their depressing effect is probably dependent upon their doing this. The application of cold has also a powerful sedative effect on the circulation, and is often applied to external parts by means of evaporating lotions. All diseases attended with excitement, and in many of which there is reason to apprehend death in the way of coma, are benefited by such remedies. Then a more permanent depressing effect is produced on the system, by what is termed the antiphlogistic regimen, *i. e.* rest, quiet, and low diet. This is one of the most useful remedies which we possess. We confine the patient to bed, feed him on slops, keep the apartment moderately cool, prohibit him from talking, and as much as possible from thinking, and allow no noise, or glare of light. Another very powerful agent of this kind is bloodletting, whose good effects depend upon a variety of causes. It weakens the action of the heart, and therefore the force with which the blood circulates throughout the body; it lessens the amount of blood, and therefore the intensity of those morbid actions which are kept up by too great flow of blood to parts of the body; and it also causes a temporary derivation of blood to the part from which the stream is flowing.

This important remedy is, however, often abused, and too indiscriminately resorted to. It is of great benefit in local inflammations in their first stage, when they are attended by a highly excited state of the circulation; but it is injurious towards their termination, when the part is becoming disorganized; also in weakly people, and in most modern British epidemics, because the fatal result that is to be contended against in them is syncope.

Of remedies acting upon the excretions and secretions, we will first turn our attention to those which produce their chief effect upon the stomach and bowels, or purgatives and emetics. They act beneficially in various manners. Foreign matter acting primarily upon the mucous coats of the alimentary canal sympathetically affects other parts, and causes some diseases, and aggravates more. Such medicines relieve these. Then they diminish the quantity of the blood, both by draining off its serosity, and also, probably, by suspending, for a time, the process of assimilation, and thus hindering the blood from receiving fresh supplies. They have a very well-marked effect in altering the distribution of

the blood, and thus they act as derivatives from other parts, particularly from the head. All purgatives, too, promote the secretion of the fluids of the intestines, and hence they cause the expulsion of matters from the body, which, if retained, would act as poisons. By diminishing the quantity of the serous portion of the blood, they promote absorption, and their utility in this way is often very great; and they have the power, to a certain extent, of promoting the discharge of the other excretions. Thus, for example, nausea and the action of vomiting promote the discharge of the mucus from the lungs and of the perspiration.

These useful effects of emetics and purgatives are not, however, always unattended with danger and objection. The altered determination of the blood is occasionally injurious in diseases of the brain; the effect of purgation is often great debility, particularly in diseases of the lungs; and the habitual use of purgatives produces the very disease it is intended to cure, habitual constipation, and a host of serious consequences.

Certain substances, chiefly of a spicy nature, have the power of expelling flatulence from the stomach to the mouth. These are called carminatives.

We possess remedies which can increase the other excretions of the body. Many substances excite perspiration, and it is very conveniently produced by the different kinds of tepid and warm bathing. This artificial perspiration is undoubtedly of use in many diseases, particularly in inflammations of the skin and mucous membranes. Medicines which produce perspiration are termed sudorifics.

The excretion from the kidneys can also be promoted by means of substances which we call diuretics. They are principally used when we wish to carry off the serum of the blood which is deposited in different parts of the body, and which deposited serum constitutes the different dropsies.

Those remedies which promote the discharge of the too abundant secretions at the lungs are called expectorants.

We can alter the chemical condition of the secretions by means of chemical remedies. Thus heartburn and gravel depend upon acidity. Alkalies relieve these. The different kinds of alkalies used form the therapeutical class of antacids.

Then we possess another class of remedies, the astringents, which restrain and lessen the different secretions and excretions, and even evacuations of blood; and when these are of such an extent as to threaten death by way of asthenia, they very often enable us to preserve life. Their use, however, requires very great care and caution, lest we stop the discharge of those excretions, which will, if retained, act as poisons.

Another class of remedies, the counter-irritants, including blisters, sinapisms, &c., seem to act in part by establishing new excretions from the body, and are

very useful in acting as derivatives from parts where certain diseased actions are taking place.

The remedies which are considered to possess a power over the nutrition of the human body, and particularly over the formation and absorption of morbid growth, are called alteratives or deobstruents. Their action is very obscure, and their effect is confined to simply organic and not to malignant changes of structure. Iodine and mercury are the two most important examples of this class.

Again, certain remedies alter the morbid constitution of the blood. We have an example of this in the good effects produced by fresh vegetable acids in scurvy.

The action of those remedies which operate upon the nervous system is pretty well understood. The class of narcotics alleviate pain and produce sleep, and are the most useful aids that the physician perhaps has. The antispasmodics possess a power of controlling spasm; and many of the tonics, as they relieve many disorders obviously of a nervous origin, must also operate upon the nervous system.

After these general remarks upon the action of remedies, we proceed to details concerning them, and, in our next chapter, describe the most important of them.

CHAPTER V.

DESCRIPTION OF THE PRINCIPAL REMEDIES.

IN describing the more important remedies used by the physician, we, perhaps, should follow the division we have just alluded to, and consider the stimulants, purgatives, &c., together. But many drugs possess more than one action, according to the manner in which they are employed, or according to the dose in which they are administered. We therefore prefer a natural history arrangement. We will consider, first, those remedies belonging to the non-organized kingdom, of which some belong to the subdivision of metals, and some do not. Then we will turn our attention to those derived from the organized creation; first, to those obtained from plants, and, lastly, to those procured from animals.

We commence with the non-metallic substances of the non-organized division.

Iodine is one of the most valuable medicines which we possess. It forms a

constituent of the texture of some of the lower animals, and of a number of vegetables belonging to the Algæ. It also exists in sea-water, and in many mineral springs. It is also, but rarely, met with in mineral ores. It exists in the sponges, and burnt sponge was used in medicine before the existence of iodine was known. Indeed iodine was only discovered in the year 1811, by a French chemist.

Iodine is obtained from kelp, which is the ash of burnt seaweed. Kelp contains a great many salts, and among the rest iodide of potassium; that is, a compound of iodine and potassium. It is separated from the rest of the matter by a chemical process, which essentially consists in adding sulphuric acid to a solution of kelp, which unites with the potassium and sets free the iodine.

Iodine is obtained in soft greyish black scales, which easily crumble when touched. When heated, it passes into a vapour of a beautiful violet colour. It is readily soluble in alcohol, but very sparingly so in water. It stains every matter which it touches a yellow brown colour. It is distinguished from all other substances by forming an intense blue colour with starch.

Although iodine itself is little soluble in water, yet the iodide of potassium is readily so; and as it possesses all the medicinal qualities of pure iodine, we often employ it. It is composed by mixing iron filings, iodine, and carbonate of potash together, upon which carbonate of iron and iodide of potassium are formed.

In large doses, iodine acts as an irritant poison; that is, it produces inflammation of the stomach and bowels. When given a little too long, or in rather too large doses, it causes irritation of the digestive organs; and when symptoms of such make their appearance, we know that it is time either to diminish the dose, or stop the exhibition of it altogether. It is a powerful exciter of the absorbent system, a tonic, and alterative.

It is used with the greatest success in "Derbyshire neck," or goitre, and, if properly managed, seldom fails to cure this unsightly appendage to the throat. In chronic diseases of organs, particularly when they are accompanied with enlargement or hardening, it is our sheet anchor; and sometimes, under its use, the disease entirely disappears, and very generally the bad symptoms are ameliorated.

Its tonic and alterative properties are taken advantage of in the treatment of scrofula; and we certainly possess no remedy half so efficacious as it is in the treatment of these distressing affections. In emaciated people in general, we are in the habit of using it successfully as a tonic.

In chronic skin diseases, especially in those of a chronic inflammatory nature, it is one of the most important remedies which we have.

The Pharmacopœia contains a tincture of iodine, a compound tincture, a compound solution of iodide of potassium, and a formula for iodine ointment.

If the tincture of iodine be the one fixed upon, we may observe that its taste is covered by sherry. Starch, besides forming the blue colour with it, very much deteriorates its properties; and therefore no sago, arrow-root, potatoes, &c., ought to be taken for an hour before or after the administration of iodine.

Ammonia is a compound of nitrogen and hydrogen. It is found in some mineral springs, and in the neighbourhood of volcanoes. Its principal source, however, is the decomposition of organized matter. Ammonia itself is a colourless gas, not used in medicine in its gaseous form; but as it is readily absorbed by water, the pharmacopœia has a formula, called water of ammonia (liquor ammoniæ). This is a colourless liquor, with a very pungent odour, and a caustic alkaline taste. As is well known, it is used for smelling-bottles. It is in these usually poured upon the carbonate of ammonia. This carbonate is also dissolved in spirit, to which are sometimes added cloves, cinnamon, &c. In this manner two very useful preparations are obtained—the spirit and the aromatic spirit of ammonia. The latter is well known by the name of *sal volatile*.

All these preparations of ammonia are alkaline stimulants. They are not, however, much used as antacids. But their stimulating effect is taken advantage of in febrile and inflammatory diseases, which are characterised by debility. Although adjuncts to, they are not in these cases substitutes for, spirit and wine. To produce a thorough stimulating effect upon the system, we must employ a remedy containing carbon, which, by uniting with the oxygen in the body, increases the animal temperature. The glow of heat, and feeling of increased strength, after a glass of wine or alcohol, are produced in this manner.

Ammoniacal preparations are much used as local stimulants. They are usually combined with oils, so as to form a liquid soap. They are rubbed upon the skin over the seat of rheumatic pains, in sore throats, &c., and, by attracting an increased flow of blood to the skin, diminish internal congestions.

Combined with vinegar, ammonia forms a salt (acetate of ammonia), which, dissolved in water, forms the solution of acetate of ammonia, popularly known by the name of spirit of Mindererus. It possesses no stimulant effects, and is much used in febrile affections, in which it probably quenches the thirst. Its diaphoretic properties are very doubtful. Its taste is not unpleasant.

Carbon is an elementary body, which exists under a great variety of external appearances. It constitutes almost the whole of plumbago, or black-lead, as it is improperly called, for it contains no lead at all, and which is used for making pencils. The diamond is entirely formed of it, and so are animal and vegetable charcoal. Animal charcoal possesses the power of discolourizing all animal matter, and hence it is the very best dentifrice that we have.

Carbonic acid gas, although when inhaled it is a most deadly poison, yet, when taken into the stomach, very often relieves nausea and vomiting. It is usually administered in the form of Soda-water,—which see.

Alcohol and æther are composed of carbon mixed with hydrogen and oxygen. They are both artificial products. The remarks we have to make upon alcohol we will defer until we reach the dietetical part of our subject. Upon æther we will offer a few observations.

The chemical theory of the formation of æther is so complicated, that it is impossible to consider it here. It is obtained from spirit by the action of either sulphuric or nitric acids. That obtained by the first of these two substances, is called sulphuric æther; and that by the latter, nitric æther.

Sulphuric æther is a colourless, very limpid fluid, of a penetrating smell, and a hot pungent taste. It is extremely volatile, and requires to be kept in bottles with ground glass stoppers. It is remarkably combustible. Little soluble in water, it readily dissolves in spirit. A hundred parts of it contain twenty-one per cent. of oxygen, thirteen of hydrogen, and sixty-five of carbon.

Sulphuric æther is a powerful stimulant, but its stimulating effects are more transient than those of alcohol, and intoxication produced by it lasts a much shorter time than when brought on by spirits. The vapour of æther, if inhaled, induces profound but temporary insensibility, or intoxication, and this has recently been taken advantage of in surgical operations, but has now given place to chloroform. The stimulating effect of æther is not much used, but its antispasmodic powers, which are probably a variety of its stimulating ones, are most important and useful. In all irregular spasmodic action of muscular fibre we use it, and almost always with benefit. The dose is a tea-spoonful, which may be frequently repeated, particularly in colic, hiccup, cramp of the stomach, and, above all, in asthma. If applied to the surface, from its quick evaporation it excites great cold, and it is sometimes employed in this manner, particularly in headache of an atonic kind.

The pharmacopœia does not contain a pure nitric æther, but it has a formula for this substance, dissolved in spirit, called the spirit of nitric æther, which is well known by the popular name, sweet spirits of nitre. The stimulating and antispasmodic properties of spirit of nitric æther, are far less than those of sulphuric æther, although, by virtue of its latter properties, it often relieves flatulent distention of the stomach. It possesses, however, very well-marked diuretic properties, which are very often taken advantage of.

Creosote is another medicinal substance, obtained in the destructive distillation of wood, and which contains a great quantity of carbon—about, in fact, seventy-seven per cent. It is an oily and almost colourless fluid, with a very peculiar odour. It possesses a most remarkable power of making flesh able to resist putrefaction, and is probably the active ingredient in the composition with which mummies were anointed. It is considered by some to allay vomiting; but its therapeutical properties have been much overrated, and its principal use is as a local application in toothache.

Prussic acid is a very powerful medicine, which also contains a large quantity of carbon, combined in this case with hydrogen and nitrogen. The dilute acid of the shops is a colourless fluid, with a very peculiar odour, resembling that of noyau. Indeed, it is to prussic acid that this liquor owes its flavour. Its poisonous properties will be afterwards considered. As a medicinal agent, it has greatly disappointed the expectations formed of it. It relieves the pain of dyspepsia in a variety of this disorder, to be afterwards described. We suspect that its therapeutical use is about limited to this affection.

Sulphur is an elementary body, which has been known from the remotest antiquity. It occurs native, particularly in Sicily and Naples, and forms a constituent of many metallic ores. Its appearance is well known—a brittle, yellow solid, with a disagreeable smell and little taste. When purified for medicinal purposes, it is called milk of sulphur, or *lac sulphuris*. Sulphur is a mild laxative, and also a slight diaphoretic. Hence it is used when a purgative is required in affections of the bowels, and in chronic rheumatism. Locally applied to the skin, it acts as a mild stimulant, and is very useful in many chronic skin diseases. In that skin disease, depending upon the presence of an insect, and vulgarly termed the itch, it is a specific. However, another substance, to be afterwards described, is equally efficacious, and less disagreeable in its application.

Combined with oxygen, this harmless substance (sulphur) forms a powerful poison—sulphuric acid, or oil of vitriol, as it is commonly called. It is much employed in the arts, and hence it is always prepared on a large scale by the manufacturing chemist. It can be procured either in a solid or liquid form. In this country it is always used in its liquid state, and the strong acid of the manufacturer is largely diluted with water for medicinal purposes. In its concentrated state, sulphuric acid acts as a caustic poison, destroying all the tissues to which it is applied. Used in medicinal doses, it is a tonic, an agreeable refrigerant, and an astringent, especially of the skin. Hence it is particularly useful in checking profuse perspiration, particularly that which attends the later stages of phthisis. Mixed with aromatics, it forms the elixir of vitriol.

The above substances constitute the more important of those derived from the non-organic kingdom, and which are not metallic. Before proceeding to describe the substances of chief importance derived from metals, and their combinations, this seems the proper place to make a few observations upon water.

Water is most universally diffused. It exists in the atmosphere, and constitutes the clouds; in the earth it composes the oceans, rivers, and springs; it is disseminated among the rocky and mineral substances, and it is a necessary ingredient in every organized body, whether animal or vegetable. By the ancients, and indeed by every one until the middle of the last century, it was regarded as an elementary body, but it was discovered by Cavendish to be a

compound of oxygen and hydrogen. A hundred parts contain nearly eighty-nine of the former, and eleven of the latter. Water can not only be separated into its elements, but it may easily be formed by uniting them.

Water is commonly described as being without smell or odour. But a large collection of it has a bluish green appearance, and camels are aware of its presence long before it is visible, and assuredly smell it. At a temperature of thirty-two degrees it is solidified, or freezes, and, unlike almost every other substance, upon assuming the solid form, it expands. It is owing to this fact that we see pipes to burst in frosty weather. Water always evaporates a little, but when raised to two hundred and twelve degrees, that is, at the level of the sea, it boils, as it is termed, and is converted into vapour or steam, the bulk of which is seventeen thousand times greater than the water from which it arises.

We shall afterwards have occasion to allude to the dietetical properties of water.

We make different uses of water in the treatment of disease, in a great measure according to its temperature. We give ice in hemorrhages from the stomach, and sometimes in fever. Ordinary cold water has a much more extensive use. In all febrile diseases, it is the drink wished for by the patient to allay his morbid thirst, and may always be safely allowed. There is a popular opinion, that unless its chill be taken off by a hot toast, or the like, it is injurious. We were a long time attached to fever wards, where an unlimited supply of cold water was used, and we never saw any ill effects produced by it. A drink of cold water often removes an hysteric or epileptic attack, a fainting fit, or an attack of nausea and vomiting.

Tepid and warm drinks are used for a variety of purposes. In large quantities they promote and induce vomiting. In lesser quantities, particularly if combined with a little stimulant, they excite perspiration, and they often remove the cough dependent upon irritation of the top of the larynx. To effect this last purpose, we often employ the vapour of water.

For a very useful external application of cold water, we refer to the remarks which we shall make upon CONSTIPATION.

The external application of water is much employed by physicians. Ice, in external hemorrhages, is often very beneficial. We shall afterwards have occasion to allude to the use of ice in cerebral affections. For a reason already stated, ice or snow is used as a friction for frost-bitten parts. In fomentations, &c., we employ hot water as a sedative of pain in swollen parts. The pain appears to depend, in these cases, upon inability of the parts to stretch, and the hot water has a relaxing effect upon them.

Water, of various degrees of temperature, is applied to the body in various ways, all of which are modifications of bathing. Bathing has been practised from the most remote antiquity; and the frequency with which it is employed, and the

degree of the luxuries and of the comforts provided for the bather, are in some sort the test of the physical civilization of an age. The cold bath is stated to range from sixty degrees to about thirty; but, as Dr. Pareira very truly remarks, when it is below fifty degrees, it is a very cold one. Its first effect is a shock, of an agreeable nature, from the impression made upon the nervous system, which is followed by what is termed reaction. The skin feels warm, and all the system, both mind and body, feels enlivened, and is invigorated. Nothing so much tends to make up for the want of exercise as cold bathing. When the water is poured from a number of small orifices, it is termed a shower bath. *Douche* is the name given to one continuous stream applied from a height, and which is intended to produce a tonic local effect.

The tepid bath ranges from where the cold leaves off, to about ninety-two degrees. It has the same good effect in some individuals as the cold has in others. Whenever the reaction after the cold bath is not strong, the preference should always be given to the tepid.

The temperature of the hot bath is from ninety-two degrees up to a hundred and six, or perhaps more. It is used to determine to the skin in measles, &c., when the rash has receded, to promote perspiration in rheumatism and other diseases, and to relieve spasm.

Sometimes the heat is applied to the body in a state of vapour, thus constituting the vapour bath. The heat of the vapour is sometimes a hundred and twenty degrees, or even more. Occasionally, with the vapour bath is combined a process of pulling of the limbs and kneading of the muscles. This is termed shampooing. The vapour bath is applicable to the same class of cases as the hot bath is.

We have spoken of water as if it were perfectly pure, but in fact spring water scarcely ever is so, but holds more or less of saline and mineral matters in solution. It is fit for all purposes, however, unless it contains so notable a quantity as clearly to affect its taste and other sensible qualities. If it does this, it is called a mineral water. Around the more important or best known of these, towns or large villages are erected, places of amusement are fitted up, and everything prepared for the numerous visitors who annually, in the summer and autumn, visit them. There is no doubt that the visitors of these watering-places, as they are called, are much benefited by their residence in them. But it may be doubted whether the beneficial effects are not owing to the change of scene and temporary relaxation from care, and not to the mineral waters. In many cases the medicinal matters which they contain are too small in amount to be, we will not say of any service, but of any influence at all. And, in fact, if we administer in towns at home the same minerals, or even the same mineral water, no good effects follow. Moreover, it is evident that one plan of pharmaceutical treatment is quite useless for the variety of cases which frequent these places,

and which are all equally benefited. Still, however, it is necessary that we make a few remarks upon mineral waters, and this seems to be as good a place as any.

One class of mineral waters, and perhaps the most useful of any, is distinguished by containing some salt of iron, and hence termed chalybeate. Such are easily recognized by their peculiar inky taste. Sometimes the iron is combined with free carbonic acid and alkalies. This is the case with the waters of Tunbridge wells, with the chalybeate spring upon the common at Harrowgate, and many others. It is but reasonable to conclude, that these and the other mineral springs containing iron will be of service in debilitated and weak constitutions.

Many mineral springs contain saline purgatives, sometimes combined with sulphuretted hydrogen. The quantity of saline matter is sometimes so small, that several tumblers have to be taken at a time. Moreover, however proper a course of purgative medicines may sometimes be, it is difficult to conceive what can induce people, frequently in the best of health, to take a very nauseous purgative every morning for a month. Among the saline mineral waters, must be reckoned those of Carlsbad, Baden, Harrowgate, Cheltenham, Leamington, &c.

Alkaline waters, not possessing much purgative power, are found at most of the above places, and also at Vichy and at Bath.

Sometimes all that distinguishes a medicinal spring is its warmth. That at Matlock is a good example. It has been supposed that this warmth is of a peculiar nature. This opinion is probably downright nonsense.

Matlock spring is also distinguished as being remarkably free from saline ingredients—less so than common potable water. This very purity is fancifully considered to communicate medicinal virtues to it. Similar pure waters are found at Malvern and Holywell, in Flintshire.

We now proceed to the non-organized metallic bodies. Metals are distinguished from other substances by being quite opaque, refusing a passage to light, although reduced to very thin leaves, and by possessing a peculiar lustre, called the metallic lustre. They unite with oxygen, sulphur, &c., forming oxides, sulphurets, &c.; and these oxides unite with the various acids, and form salts. Metals may be conveniently subdivided into those whose oxides are alkalies and earths, and those whose oxides are neither.

The existence of the metal potassium has only been known since the early part of the present century, when it was discovered by Sir Humphrey Davy, and by him separated from its oxide, potash. So strong is its affinity for oxygen, that it can be kept neither in air nor water. In either case it very rapidly absorbs oxygen, and becomes potash.

Potash is obtained for medicinal purposes from the carbonate of potash, by separating the carbonic acid by means of lime. In this manner it is procured

in the form of a white solid, which is called caustic potash. It is soluble in water, and an officinal solution of it is termed liquor potassæ. Potash is powerfully caustic, and it is employed for making an issue. A little of it rubbed upon the skin causes speedy mortification; and in the aperture so formed, a pea, or some similar matter, is daily put, to prevent the wound from healing. The discharge by pus, and the inflammation thus set up, act as powerful counter-irritants. The liquor potassæ is a very useful alkaline remedy for acidity of the stomach. A little sherry covers its taste. Many chronic skin diseases are connected with or dependent upon an undue state of acidity in the digestive organs, and perseverance for some time in the use of this remedy often cures them. Liquor potassæ is, too, a diuretic.

Saltpetre, or nitrate of potash, is found in large quantities in the soil of various places, particularly in that of many parts of India. Its appearance is well known. It is a refrigerant and diuretic, but is, perhaps, not so much used as it was formerly.

Carbonate of potash occurs in many vegetables. It is obtained by burning such, and dissolving the ashes. By adding more carbonic acid to it, we procure the bicarbonate, a more eligible medicinal substance. It is used as an antacid, and for making effervescing powders.

Bitartrate of potash, or cream of tartar, is a constituent of many vegetables, and especially of grapes. The inside of casks which have contained wine is thickly coated with it. In its impure state it is called tartar: so named, says Paracelsus, "because it produces oil, water, tincture, and salt, which burn the patient, as hell does." In large doses it is a purgative, and in smaller a diuretic and refrigerant. It is much used in its latter capacity, and forms a principal ingredient of imperial, many receipts for ginger beer, &c.

Sodium was discovered a few days after potassium, and is procured in a similar manner.

Chloride of sodium, or common salt, occurs in an enormous quantity in the waters of the ocean, and in many springs, which are called brine springs. It is from these latter that it is procured in this country for dietetical purposes. It is usually obtained by evaporating the brine by means of heat. When, as is done in warm countries, it is procured by the heat of the sun, from the sea, it is called bay salt.

As salt is a necessary constituent in the blood, a regular dietetical supply of it is absolutely necessary. In medicine it is used in doses of two or three spoonfuls, to excite vomiting. Externally, either an artificial solution of salt in water, or sea-water, is used for bathing in. It is a little more stimulating to the surface than cold water is. It is a popular opinion, that bathers are less liable to take cold after the salt water than after the fresh bath. This is probably incorrect.

Sulphate of soda, or Glauber's salts, is a good purgative medicine, but very nauseous to the taste.

Borate of soda, or borax, is used as a stimulating application to ulcers of the tongue, lips, &c.

Phosphate of soda is a purgative salt, not so much employed as its utility deserves. It is the very best means which we possess of relieving the habitual constipation of old age. Given in soup which has no common salt in it, it cannot be tasted.

The carbonates of soda are two very important salts. They were known to the ancients under the name of nitron. They are procured either from barilla or from kelp. Their medicinal properties are similar to those of the carbonates of potash, and they are used in the same cases. They are also much employed in making the common effervescing powders. These powders are useful in checking perspiration, in allaying thirst, and in diminishing febrile heat. Soda-water ought to be a solution of carbonate of soda, charged with carbonic acid gas, but in the majority of cases the soda is omitted. Seidlitz powders are the common effervescing powders, with the addition of a tea-spoonful of tartarized soda, which is a purgative. They are best taken in warm water, and the quantity used should at least fill three-quarters of a tumbler. They should always be taken before breakfast.

By mixing alkalies and oils together, the substance called soap is formed. A tincture of soap is used as an external application. It is moderately counter-irritant. Its scientific name is tincture of soap; its vulgar, opodeldoc.

The most important combinations of calcium are its oxide or lime, its chloride, and its carbonate or chalk.

Lime, and the manner of preparing it by burning chalk in a kiln, has been known from the remotest antiquity. It dissolves in water, and in dissolving much heat is thrown out. The lime-water thus formed is used as an antacid. It is best given mixed with milk. Lime-water, with oil, forms a liquid soap, which was formerly much used in burns. The treatment of these injuries by cotton has almost superseded it.

Chloride of calcium, or muriate of lime, as it used to be termed, exists in sea-water, and in many saline springs, and is readily formed by dissolving marble or chalk in muriatic acid. We mention it here, because it has been supposed to possess some specific efficacy in the treatment of scrofula.

Chloride of lime (that is, oxide of calcium), or bleaching-powder, is an important medicinal agent. It is prepared by passing chlorine gas over lime. It has the power of destroying putrid odours, and of resisting putrefaction, and, perhaps, of destroying the matter of contagion. A solution of it is the most effectual remedy which we possess of relieving tickling in skin diseases, and it is a most effectual cure for the itch.

Carbonate of lime, or chalk, is found very abundantly. When it occurs in a very compact form, it is called marble. The best marble is obtained from Carrara. A weak lime-water, charged with carbonic acid, has been recently introduced, under the name of Carrara water. It does not present any advantages as a beverage over soda-water: in some states of the system, that is, when there is too much lime already in the system, as sometimes happens, it is injurious; and, moreover, there is nothing new in the idea of preparing it. All that is novel in it is its name. Chalk also forms a great part of the shells of animals. Its medicinal properties are of an absorbent, antacid, and astringent nature. It is extensively employed in diarrhoea. There are several pharmaceutical preparations of it.

The pharmaceutical preparations of magnesium are its oxide or magnesia, its carbonate, and its sulphate or Epsom salts.

Magnesia is made by exposing the carbonate to a strong heat, by means of which the carbonic acid is expelled. The carbonate is found native in various parts of the world, but is usually obtained by mixing the sulphate with carbonate of soda, the result being sulphate of soda and carbonate of magnesia. The therapeutical properties of both magnesia and the carbonate are identical. They are both used as antacids and mild purgatives. The objection to their frequent use is, that they sometimes form concretions in the bowels. Magnesia water is prepared in the same manner as soda water, but is not generally thought so pleasant.

Sulphate of magnesia is called Epsom salts, because it was originally procured from the Epsom waters. It is now obtained from dolomite or magnesian limestone, or from bittern, which is the residue of sea-water after common salt has been extracted from it. As a mild, safe, and cheap purgative, it is the one usually chosen in inflammatory or febrile affections. For general purposes, it is perhaps the best purgative which we possess. Its only objection is its nasty taste, which may be much covered by strong mint water.

Alum is the sulphate of alumina and potash. Its principal use is as a topical astringent in hemorrhages, particularly in those of the nose.

We now proceed to the consideration of those metals whose compounds are used in medicine, and whose oxides are neither alkalies nor earths.

Iron, the Mars of the alchemists, is the most useful and the most widely distributed of all the metals. It has been known from a remote antiquity, and it has been used in medicine for more than three thousand years. It rarely occurs native, and when it does, it is probably of meteoric origin. Ores of iron are, however, very abundant. Iron is principally extracted from clay iron ore, and magnetic iron ore, both of which are oxides of iron. This is done by exposing the ore, along with charcoal and lime, to a very high temperature. The carbon unites with the oxygen, and the lime combines with the impurities of

the ore, and forms a fusible compound, technically called slag. The whole mass being fused, the metal, from its superior weight, sinks to the bottom. At the bottom of the furnace is a hole, filled with sand. At this period of the process, the sand is knocked away, and the iron flows out. The iron thus obtained is the cast-iron of commerce. It is far from being a pure metal. It contains a considerable quantity of carbon, unreduced ore, and earthy substances. It is converted into pure or malleable iron by again exposing it to heat, and taking care that a current of air play upon its surface. By this means the ore is reduced, the carbonaceous matter is burnt, and the earthy impurities rise to the surface as slag. It is a curious fact, that as the purity of the iron increases, its solubility diminishes, until at length, although the temperature continues the same, it becomes solid. It is then rolled and hammered, by means of which its particles are approximated, and its tenacity increased.

To form steel, which is a compound of carbon and iron, malleable iron is packed up with charcoal, the air is carefully excluded, and it is exposed to a strong heat for many days. In this manner it combines with from one to one and a half per cent. of carbon. The appearances and properties of steel are well known.

Iron is by far the strongest or most tenacious of all metals. Two pieces, heated to redness, may by hammering be joined together, or welded. It is attracted by the magnet, and may itself be rendered permanently magnetic. Iron has a strong affinity for oxygen, and its surface, if it be exposed to moist air, is soon covered with its first oxide or rust. Heated to redness in the open air, it absorbs oxygen rapidly, and forms a second oxide, called the black oxide of iron. This oxide may be observed round the end of a kitchen poker.

There are several officinal preparations of iron, which we need not describe. The most important are the muriate and the carbonate.

The tincture of the muriate is prepared by adding muriatic acid to the oxide of iron, and then dissolving the product in spirit. This is one of the oldest and best preparations of iron. It is often prescribed, along with an infusion of quassia. The carbonate is prepared by adding carbonate of potash to a solution of sulphate of iron. Sulphate of potash and carbonate of iron are thus formed. Carbonate of iron is very liable, if exposed to the air, to become converted into the inert oxide. Curiously enough, it has been found that the presence of sugar prevents this.

Of all the medicinal metals, iron is perhaps the most useful. Iron is a necessary constituent of the blood, and it is not easy to say whether, when taken as a drug, it acts in a dietetical manner or otherwise. Certain it is, that it is useful in that important class of diseases caused by a deficient condition of the iron of the nutrient fluid, and characterized by pale and exanguineous skin, extreme debility, palpitation of the heart, and deficient appetite. From the

languid state of the circulation, there is often partial dropsy. Under the use of iron in such cases, the skin becomes florid and ruddy, the weakness disappears, the heart no longer palpitates, the appetite is good, and there is no more dropsy. In the diseases of the nervous system, characterised by spasmodic actions, as in St. Vitus' dance, iron is almost a certain specific. So, also, it is in tic douloureux. Both these diseases are accompanied by deterioration of the blood. Iron is useful in the course of all chronic diseases, provided the described state of the circulation be present.

Zinc, and those of its compounds which are used in medicine, will not require much consideration. Zinc was described by Albertus Magnus in the thirteenth century. In commerce it is often called spelter. It is obtained from calamine, which is the carbonate, or from the native sulphuret, which is the zinc blende of mineralogists. Its preparation from the latter is an instance of what is called distillation by descent. The furnace is closed above, but is pierced at the bottom by an iron tube, the upper aperture of which is in the interior of the furnace, while its lower terminates above a vessel of water. The vapour of the zinc passes down the tube, and is condensed. There are zinc-works established in Glamorganshire, but the greater part of that used in this country is imported from Silesia. Zinc is a very hard metal, with a bright metallic lustre, and a bluish-white colour. It undergoes little change when exposed to the air or to water, and hence is a suitable covering for roofs, &c. The most important of its medicinal compounds are its oxide and its sulphate.

The oxide is a white inodorous powder, almost without taste. It is used as a tonic in chronic diseases of the nervous system, as hysteria, epilepsy, whooping-cough, &c. It probably is not of much efficacy.

The sulphate is a more useful remedy. It is found native, but may readily be formed by dissolving zinc in sulphuric acid, and adding some water, to furnish the oxygen. Externally, it is used as a stimulating application. Dissolved in water, it is often employed as a collyrium in chronic ophthalmia. In small doses it is a tonic, but its most important use is in larger ones, as an emetic. It is the very best which we possess in cases of narcotic poisoning, as it acts very rapidly.

Black sulphuret of antimony was used by the Hebrew and also by the Greek ladies, to paint their eyebrows with. It was first made known as a metal in the fifteenth century, by Basil Valentine. He tried its efficacy, says the tale, upon some monks. It killed them, and he very deliberately gave the name of antimony (antimonk) to it from this circumstance. It is usually prepared by roasting the sulphuret. Antimony is a brittle metal, of a whitish grey colour. It forms two important medicinal compounds—the compound powder of antimony, or James' powder, and tartar emetic.

Antimonial powder was patented by Dr. James, who died in 1776. The

specification which Dr. James lodged is worded, doubtless purposely, so that the powder cannot be prepared by it. It acquired much reputation as a sudorific powder in fever. The College of Physicians have a formula, which imitates, and is doubtless identical with it. Its properties probably depend upon antimonite of lime. Many are of opinion that the regular preparation is inferior to the secret one. The truth probably is, that the advantages of James' powder were grossly exaggerated; and the medical men, because they did not see the wonderful results which were said to follow its employment, condemned the drug which they used. In the majority of cases of fever, there is no earthly reason for giving sudorifics; and in rheumatism and skin diseases, we possess far better and more certain excitors of perspiration than the vaunted James' powder.

Potassio-tartrate of antimony, or tartar emetic, is a very valuable remedy. It is prepared by mixing bitartrate of potass with oxide of antimony. It is a perfectly white inodorous salt, with a slightly sweet taste. Used externally, it is a powerful irritant, producing a crop of pustules upon the skin. It is sometimes employed in this manner as a counter-irritant, but the irruption thus produced is very painful. Hence, to effect this purpose, croton oil is now more employed. If administered internally in small doses, it produces perspiration, and also exhalation upon the mucous membranes. In larger doses, it creates great nausea and depression; in still larger, vomiting; and in excessive or poisonous doses, it acts as an irritant poison. Advantage is taken of all these properties, except the last. As an emetic, we use it when we wish to make a powerful shock upon the system. Its emetic properties are observed when it is injected into the veins; and sometimes, when pieces of meat have been stuck fast in the œsophagus, this has been done, and the vomiting thus excited has removed them. As a nauseant, it is remarkably useful in inflammation, particularly in inflammation of the substance of the lungs, and in continued fever, when the chest symptoms are prominent. Also, dependent probably upon its nauseant effect, it is very useful as an expectorant in chronic affections of the lungs.

Arsenic possesses greater interest as a poison than as a medicinal agent, and we therefore defer its consideration until we come to treat of poisons. As a remedy, it is useful in intermitting diseases, and is employed when quinine has failed, and also as an alterative in chronic skin diseases. It is used in combination with potash.

Bismuth was known to the ancients, but confounded by them with lead and tin. It derived its name bismuth, or rather wismuth, from the German miners. It occurs native. It is a brittle reddish-white metal, without taste or smell. The only compound of it used in medicine is the nitrate, or rather the trisnitrate. This is prepared by mixing bismuth, nitric acid, and water together. It has received various names. One of them is pearl-white, and

under this appellation it is used to paint the cheeks white. It is a tonic and slight astringent, and seems to act something like an alkali. Its use is almost confined to that particular form of dyspepsia, attended with eructation of fluid, or water-brash.

Copper is an abundant metal, and was well known to the ancients. It is the Venus of the alchemists. It occurs native, but it is usually prepared by roasting from the sulphuret. It is distinguished from all other metals, with one trifling exception, by having a red colour. It is hard, elastic, and sonorous. United with tin, it forms bronze and bell-metal; and with zinc, brass; and in another proportion, pinchbeck. The most important medicinal salt of copper is the sulphate, popularly known by the name of blue vitriol. It is found in copper mines. It has a fine blue colour. It is used externally to stimulate languid ulcers, and to check too exuberant granulations. Administered internally, it sometimes acts as a tonic upon the nervous system, and under its use epilepsy and chorea have sometimes subsided.

Lead, the Saturn of the alchemists, has been known from the remotest antiquity. All the lead of commerce is extracted from galena, which is the sulphuret of lead. Lead has a bluish-grey colour, and when fresh cut a strong metallic lustre; but it soon tarnishes, or acquires oxygen, from exposure to the air. It is very soft and flexible, and possesses the least tenacity of all the ductile metals. In distilled water, if air be carefully excluded, lead undergoes no change; but in open vessels it rapidly acquires both carbon and oxygen from the air, forming the poisonous carbonate. Curiously enough, the presence of neutral salts—and most spring waters contain such—impairs this action between the lead and the air. This is the reason that spring water is often not rendered poisonous by being kept in lead cisterns or pipes, and that pure rain water, under such circumstances, is so apt to become impregnated with lead. The long-continued use of lead, or its frequent reception into the body in any way, as happens, for instance, to house painters, produces very curious results. One of these is called the lead colic, in which the pain is more severe than in ordinary colic. The other, and which generally comes after the colic, is paralysis, usually of the legs. The only important medicinal salt of lead is the acetate.

Acetate of lead, or sugar of lead, as it is commonly called, is obtained upon a large scale by dissolving oxide of lead in vinegar, and then evaporating the mixture. It is the most valuable astringent, with the exception of opium perhaps, which we possess. In diarrhoea and dysentery, in hemorrhages and in the hectic perspirations of consumption, we often witness its good effects. It is best combined with opium. Generally it is a sedative and astringent. The solution of the diacetate is commonly called Golard water, and is with many a favourite evaporating lotion.

Silver is the Luna of the alchemists, and, like gold, has been known from

a remote antiquity. It is found native in the state of amalgam with other metals, and in various ores. Goldsmiths' silver contains both copper and gold. Silver has the clearest white colour of all the metals, and takes, as every one knows, a beautiful polish. It is very malleable and ductile, and possesses considerable tenacity. It is used by dentists for stopping up holes in the teeth; but the use of it is objectionable, as it soon becomes black. It forms, with nitric acid, a salt—the nitrate of silver—of great utility in medicine. This is commonly called lunar caustic, and it used to be known by the elegant appellation of the infernal stone. When heated, lunar caustic fuses, and it is sold in the shops in the form of fused sticks or pencils. The local action of nitrate of silver upon the body is a stimulant and caustic. Applied to the skin, it produces a white mark, which speedily becomes black. In a few days this blackened bit falls off. When applied to an ulcer or mucous membrane in the same manner, it first makes a white mark, which afterwards becomes a black eschar; the adjacent parts are stimulated. Well mixed with bread, it may be safely administered internally. It is a tonic to the nervous system. If taken for any length of time, it has the extraordinary effect of turning the skin blue. Unfortunately, no remedy or preventive is known for this. This is a great pity, for it is perhaps the most useful drug which we have for the treatment of epilepsy. As an external agent, its uses are very valuable. We use it to suppress warts and exuberant granulations, to stimulate indolent ulcers, and in an especial manner those of mucous membranes—as those of the throat, for instance, in many diseases of the eye, &c.

Mercury or quicksilver was well known to the ancients. It was, however, only used medicinally by the Arabian physicians, and they merely ventured to apply it externally. Its internal administration was reserved for that boldest of quacks, Paracelsus. The most important quicksilver mines are at Idria in Carniola, and at Almaden in Spain. It is found in these in its native state, but more commonly combined with sulphur. To this ore the name of cinnabar is given. From this the mercury is easily separated, by mixing it with iron filings, and exposing it to heat.

Quicksilver is distinguished from all other metals by being at ordinary temperatures fluid. It has a tin-white colour, and strong metallic lustre. At forty degrees below zero it becomes solid. In this state it is malleable, and may be cut with a knife. It is very heavy. It is imported into this country in iron bottles, but sometimes in bottles made of goat skins, three or four layers thick. When intimately mixed with pulverized or fatty bodies, it becomes oxidated, loses its metallic appearance, and, in the cant of pharmacology, is said to be *killed*.

Some of the compounds of mercury are corrosive poisons, but all of them occasionally induce severe diseases. One of these is called mercurial erythema, and very much resembles typhoid fever. By the continued use of mer-

curials, in most people the state called salivation is brought on, which occasionally leads to fatal sloughing of the throat, &c. A good many diseases of the skin are also excited by mercurial medicines, and we also occasionally witness very frightful diseases of the nervous system brought on by mercury. The best known of these is the shaking palsy, *tremor mercurialis*.

None of these effects, however, should be allowed to follow the well-regulated medicinal exhibition of mercurials. They appear to possess a stimulating power over most of the secreting glands, particularly those concerned in digestion, and also over the absorbent system. Hence they are employed as purgatives, in torpor of the liver or bowels, to remove dropsical swellings, and as alteratives.

An immense number of compounds of mercury are in use in medicine. The pharmacopic blue pill is prepared by *killing* metallic mercury with preserves. It is an oxide. Mercurial ointment is obtained in the same manner, only fat is used instead of preserves. Calomel, which is a chloride of mercury, is prepared by mixing common salt (chloride of sodium) with sulphate of mercury. Corrosive sublimate, which is another chloride, is prepared in the same manner, but the salt is used in a different proportion. Golden ointment is an ointment of nitrate of mercury, and is a good local stimulant, particularly in chronic inflammation of the eyelids. Many of the other officinal preparations are very little employed.

We now turn our attention to medicines derived from the vegetable kingdom, and commence with sugar. We shall rapidly run through the dietetical uses of sugar afterwards. It is so useful in pharmacy, that we will in this place consider its general properties.

Sugar occurs in the juice of the sugar-cane, of the maple, of the beet-root, in potatoes, in the nectaries of most flowers, and in many other vegetables. That used in this country is entirely derived from the sugar-cane. This plant is, as is well known, extensively cultivated in both Indies. The canes, when ripe, are cut close to the ground, their leaves are cut off, and being tied into bundles, their juice is squeezed out by the aid of machinery. It is then evaporated, and when it has acquired the required consistency, allowed to crystallize. A portion of it does so, and is called muscovado or raw sugar. The uncrystallized portion is termed molasses or treacle. The muscovado sugar is refined in this country, and then becomes loaf sugar.

Sugar, when pure, is white and inodorous, but in the state in which it arrives in this country, is of a yellowish-brown colour. Dissolved in water, and allowed slowly to evaporate, white sugar-candy is obtained. When heated, it melts, becomes coloured, and is called barley-sugar. Heated still more, it is converted into a substance called caramel. Sugar dissolves to any extent in hot water, and in one-third of its weight in cold. This solution has a viscid consistency, and is called syrup.

It is a very singular fact, which has long been practically known and acted upon, that starch can be converted into sugar. This is done in the process of malting. The starch of the barley becomes the sugar of the malt. So also may woody fibre. We see this done in fruits, which are at first of a sour taste, implying the absence of sugar; but which, when ripe, are full of it.

Sugar is composed of carbon, oxygen, and hydrogen, with which some water is chemically combined.

Placed under certain circumstances, sugar undergoes a very remarkable change in the relative position of its elements, and in its properties. When a saccharine solution is placed in contact with substances in a state of decomposition, it is observed that, after twenty-four hours, if the temperature be kept between thirty-eight and eighty-six degrees, the taste of the sugar has disappeared, carbonic acid gas has been evolved, and the liquid has obtained intoxicating properties. In fact, it has become wine or beer, and contains alcohol, which can be separated by distillation. In making beer, the substance, in a state of decomposition, is yeast or ferment; in making wine, it is the skins of the grapes.

The medicinal use of sugar is principally to allay tickling cough, but in pharmacy it is employed for many purposes—for covering the taste of nauseous drugs, giving bulk and form to powders, and, from its antiseptic nature, to preserve fruits, pulp, &c. We had before occasion to allude to its power of maintaining carbonate of iron in the state of carbonate.

Colchicum, or meadow saffron, was used by the ancient Greek physicians. The parts employed in medicine are the bulb and seeds. The effect of moderately large doses of it is to produce nausea, vomiting, and diarrhoea. It is a sedative of pain. Colchicum had fallen out of use until about fifty or sixty years ago, when it was reintroduced into the treatment of gout and rheumatism. There can be no reasonable doubt of its good effect in both these disorders. It has also been found useful in hysteria, which at any rate has this analogy with gout, that it is only found in a highly civilized, luxurious state of society.

Aloe is the name given to the concrete juice of the leaves of various species of aloe. Aloes are imported from Socotra, Bombay, Barbadoes, and the Cape of Good Hope, those from the first-mentioned place being considered the best. Besides being much employed in human, they are extensively used in veterinary and canine medicine. In small doses they act as tonics, and have a decided stimulating effect upon the liver. In larger ones they are purgative. They are employed as tonics in dyspepsia and jaundice, as ordinary purgatives. There are a great number of pharmaceutical preparations of them.

Squill has been used from a very early period in medicine. It is said

to have been worshipped by the Egyptians. Pythagoras is stated to have written a book upon it. Squill is the bulb of the *Squilla maritima*, or sea onion. It is abundantly found upon the shores of the Mediterranean. It is also imported from St. Petersburg and Copenhagen. In small doses, squill is a diuretic and expectorant; and in larger, it excites nausea and vomiting. It is used with advantage in dropsies which do not depend upon renal disease, and in chronic pulmonary diseases.

Ginger has been known from a very early period. The *Zingiber officinalis*, the tree from which it is obtained, is cultivated in the tropical parts of Asia and America. The young shoots, which are put forth every spring, are scalded, and preserved in jars with syrup. They then form preserved ginger. The ginger root is prepared when the stalks are withered, which happens when they are about a year old. The roots, or rather rhizomes, are dug up, scalded, and dried in the sun. The taste of ginger is aromatic, hot, and biting. Its smell is pungent, but agreeable. Two kinds are known in commerce—the white and the black. The finest white is brought from Jamaica. The East Indies white ginger is far less colourless. It is imported into this country in bags, each of which weighs about a hundred-weight. Ginger is an acrid aromatic, which operates as a stimulant upon the whole system, but especially upon the organs of digestion and respiration. It is very useful as a stimulus in weak and enfeebled habits, and gives great relief in flatulence. It prevents nausea and vomiting, and hence is a useful adjunct to many other medicines, when we wish to avoid these symptoms. Minced in the mouth, it excites a great flow of saliva, and is sometimes useful in toothache.

Turmeric is the root of another plant, of the same family as the *Zingiber*. It is the principal ingredient in curry-powder. It is imported here from India and China.

From the pine are extracted two or three articles used in medicine. Different members of the fir tribe are called pine and larch. From them turpentine, oil of turpentine, resin, pitch, and tar, are obtained. Turpentine is principally procured from American pines. A hollow is cut in the tree, a few inches above the ground, and the bark removed for the space of eighteen inches above it. From March to October the turpentine runs into this hollow, from whence it is transferred into casks. A variety of turpentine exudes from the *Abietis resina*. This is called frankincense. Other varieties—Venice turpentine, Canada balsam, &c., are met with in the markets. They are all very similar in taste and odour. They soften and become fluid by heat, readily take fire, and burn with a white flame. They are soluble in alcohol, and yield, by distillation, a volatile oil.

They are local irritants, and in this, as well as in their other medicinal uses, resemble the oil of turpentine, now to be alluded to.

Oil of turpentine, or, as it is erroneously called, spirit of turpentine, is obtained by distilling turpentine. What is left is resin. Oil of turpentine is a colourless, limpid fluid, with a hot taste, peculiar smell, and of a very inflammable nature. It is composed of carbon and hydrogen.

In small doses, oil of turpentine possesses two distinct effects. It is a general stimulant, but more particularly acts upon the kidneys and skin, and it has an astringent power over mucous surfaces. Used externally, it is a very excellent counter-irritant. The special diseases in which it is employed are numerous. We may instance dropsy and rheumatism.

The resin, or rosin, which is left after the separation of the oil of turpentine from turpentine, is a compact, solid, brittle substance, of an inflammable nature. It is only used in surgery. It is the principal ingredient in the well-known basilicon ointment.

Burgundy pitch is the resin of frankincense, after the oil has been got rid of. It is a hard, brittle substance, of a yellowish-white colour, and of a peculiar, but not disagreeable odour. It is only used externally, to form plasters. Besides keeping the parts to which they are applied warm, pitch plasters may have a slight counter-irritating effect. They are, however, particularly in warm weather, a disagreeable application, and a fold of flannel, or a hare's skin, may very often be conveniently substituted for them.

Tar is extracted from the roots of the fir. It has been known from time immemorial, and the process for procuring it is identical with that which Theophrastus describes the ancient Macedonians as practising. A hollow is made in the ground at the side of a bank. The roots of the fir are closely packed in it, and set fire to. The tar exudes and flows through a hole in the bank into vessels set ready to receive it.

Tar is brought into this country in large barrels, of which by far the greater part come from Russia. It is a dark-brown semifluid substance, and is an excellent stimulating application in chronic skin diseases.

When tar is distilled, an oil and pyroligneous acid pass from it, and a black solid is left behind. This is pitch, which is also employed as an external application in skin diseases.

Juniper trees are found in the north of Europe. The berries are pretty strongly diuretic, and are frequently prescribed in dropsy. As the spirituous liquors called Hollands and British gin are flavoured with them, we often use these compounds in dropsies.

Quercus pedunculata is the botanical name for our ordinary British oak. This tree was held sacred, not only by the Druids, but by both the ancient Greeks and Romans. Upon another species of oak the nutgall is found. This is a vegetable production, but is caused by the irritation of an acrid liquor inserted along with its eggs into the bark by a beetle. Both the galls and all

parts of the oak are strongly astringent, and may be given with advantage in all cases where astringents are required.

Humulus lupulus, or the hop plant, was introduced into this country in the reign of Henry the Eighth. It is extensively cultivated in Kent, Sussex, and other counties of England—the object being, as every one knows, to obtain an adjunct to beer which will increase its bitterness, and perhaps promote its keeping properties. The hops of commerce consist of scales, nuts, and the yellow dust upon the scales, which is a vegetable secretion, and to which most of the properties of hops are owing. The emanations from hops are considered to be soporific, and a pillow of them is sometimes used to promote sleep, particularly in mania. Taken internally, hops are tonic and sedative. To obtain their tonic effect, there is no better plan than to order well-hopped beer. They are sometimes, but rarely, employed to calm nervous irritation.

Pepper was well known to the ancient Greeks, and was used in medicine by Hippocrates. It is cultivated now in the East and West Indies. The stem of the pepper-tree is ten or twelve feet long, and jointed. The fruit is at first green, then it changes to red, and afterwards becomes black. The finest are soaked in water, which bursts the tegument, and this only is black. In this manner white pepper is procured. Pepper, among other substances, is composed of a volatile oil, a resin, and a peculiar substance called piperin. Pepper, as every one knows, is one of the stimulating spices. It is used medicinally in atonic states of the digestive organs, and sometimes it is added to sinapisms, to increase the strength of the mustard.

Croton tiglium is the name of the tree from which croton oil is procured. It is a middle-sized tree, from fifteen to twenty feet high. It is an inhabitant of India. Its flowers produce some seeds called croton seeds, from which the croton oil is obtained by expression. It is an amber-coloured fluid, of a hot and acrid taste. Applied to the skin, it brings out a crop of pustules, which are not attended by nearly so much pain as those brought on by tartar emetic. Swallowed in doses of one or two drops, it is a remarkably useful hydragogue cathartic, which greatly reduces the strength of the circulation. It is not only valuable on account of its speedy and powerful action, but also on account of the smallness of its dose, which enables us to administer it when the power of swallowing is lost, as in comatose affections, and also in those instances where the patient refuses to swallow, as sometimes happens in mania. In all such cases, the oil may be dropped upon the tongue. It is used in obstinate constipation, as in that produced by the poison of lead; but its most important application is as a derivative from the head in comatose affections. In such cases it is often most useful. Its most important external application is as a counter-irritant in chronic diseases of the lungs, particularly in tubercular phthisis.

Croton eleuteria is a tree inhabiting the Bahama Islands and Jamaica. Its bark is used in medicine, and is known as cascarilla bark. It is imported into this country in fragments of quills, rarely more than three or four inches long. Its taste is warm, spicy, and bitter, and is pleasant. When burned it emits an agreeable odour, on which account it is an ingredient of fumigating pastiles. It is also occasionally mixed with tobacco, and smoked. Indeed this was the first use to which it was put in this country. It is now employed as an aromatic bitter in diseases of debility, and is, from its odour, a pleasant adjunct to other tonics.

Ricinus communis, or Palma Christi, is the tree from which castor oil is procured. The castor oil plant has been known from the remotest antiquity. Some of its seeds have been found in an Egyptian sarcophagus, which are supposed to be four thousand years old. It has been conjectured that it is the plant, rendered in our version *gourd*, under which Jonah sat. It was used by the Greek physicians, and it obtained its name from *ricinus*, the Latin for tick, on account of the resemblance of its seeds to that little insect. Cultivated in Great Britain, the ricinus is an annual, but three or four feet in height; but in other and more genial countries, it is a perennial tree of considerable size and height. The seeds contain the castor oil. This is extracted either by expression or coction. That obtained in the former manner is the better, and is known by the name of cold-drawn. The usual manner of preparing it by coction is by boiling it in water, when the oil rises to the surface. Oil so obtained is more apt to become rancid and to disagree, than the cold-drawn. It is imported from India, the States, and from Jamaica; but by far the largest quantity comes from India. Unlike the other fixed oils, castor oil is perfectly soluble in alcohol, and this affords a ready test of its purity. The colour of castor oil is a pale yellow. It is lighter than water, and therefore swims upon it. Exposure to the air makes it thick and rancid. Castor oil is well known as a mild and safe purgative, suitable for delicate people, and in inflammatory states of the intestinal canal when purgatives are necessary. The only disadvantage attending it is, that it usually excites a good deal of nausea. Rather singularly, it acts almost as a poison upon horses.

Euphorbium was discovered in the reign of Juba, king of Mauritania. It is obtained from an euphorbia, but of what species is unknown: it is procured by making incisions into the plant; it consists of irregular yellowish leaves of an acrid taste, the dust of which is an effectual sternutatory. Euphorbium is a powerful irritant. Applied externally it is a vesicant, and mixed with pitch a counter-irritant. As a caustic, it is sometimes employed to remove warts. It was formerly used as a drastic purgative, but is now superseded by croton oil, which is much safer. It is perhaps occasionally used to provoke sneezing. The workmen who grind it in the drug mills, sometimes suffer severely from its

effects, and occasionally it has produced temporary insanity. Dr. Pareira was called in to see an Irish labourer who, having inhaled it, had gone crazy, and insisted upon saying his prayers at the tail of the mill-horse.

Cinnamon is mentioned in the Pentateuch. It was well known to the ancient Greeks and Romans, and indeed it was used medicinally by Hippocrates. It is the bark of a large tree, cultivated from time immemorial in Ceylon, and also in Java. It is imported in bales, boxes, and chests. Its odour is highly fragrant, and its taste warm, aromatic, and, to most palates, agreeable. It contains an oil—oil of cinnamon—to which it owes its aroma, &c. In moderate doses it improves the tone of the digestive organs, and hence is properly employed by the cook. As a cordial and stimulant, it is used in atonic conditions of the system. It is also a slight astringent, and as such is combined with chalk in the treatment of mild diarrhoea. It is, moreover, an efficient carminative. Cinnamon water affords a very nice medium for administering other remedies.

Cassia and oil of cassia are often substituted for cinnamon and oil of cinnamon, which in most respects they very much resemble. Their odour and taste are not, however, so fine. Their medicinal properties are equally efficacious. They are used for the same purposes as cinnamon.

Camphor was not known by Europeans before the eleventh century. It is the produce of a tree, the *Camphora officinarum*, an inhabitant of China, Japan, and Cochin-China, and every part of which, particularly its flower, evinces, by its smell and taste, how strongly it is impregnated with camphor. The camphor is obtained by boiling the chopped wood. In this manner the camphor is separated, and it attaches itself to pieces of wood, or bits of straw, which are introduced into the water. When this crude camphor arrives in this country, it is refined by sublimation. It is put into thin flint-glass flasks, which are imbedded in the sand-bath, and heated. When the camphor melts, lime is added, and the heat is increased so as to sublime the camphor. When this has been done, a little water is thrown upon the glass vessels, which causes them to crack, and the cake of camphor is removed, the lime with the impurities lying at the bottom. This is scraped off, and we have refined camphor.

Refined camphor is translucent, has a strong peculiar aromatic odour, and a bitter aromatic taste. It is, at ordinary temperatures, solid, soft, and very tough—so tough that it cannot be powdered. Adding a drop or two of alcohol to it, however, renders it easily pulverizable. If kept in an uncorked bottle it evaporates. It is combustible, and being lighter than water, swims upon that liquid. A very curious fact connected with camphor is, that if a little piece be put into perfectly pure water, it immediately commences rotating with considerable rapidity in it; but the moment a particle of dust or grease is introduced, it stops. We are not aware of any satisfactory explanation of this.

The most contradictory opinions of the action of camphor upon the animal economy prevail. Its vapour possesses the power of killing insects, and hence pieces of it are kept in herbaria, &c. Given in large doses to the higher animals, or to man, it acts as a poison; but the symptoms which have been described to have occurred in such cases are remarkably variable. Its action seems principally to be upon the nervous system. In large doses it obscures the powers of the mind and the senses, and sometimes produces convulsions. Some are of opinion that camphor excites the circulation, while others, on the contrary, maintain that it depresses it. Applied locally, it is an irritant.

Owing to the uncertainty which prevails relative to its action, camphor is now, perhaps, little used in medicine, except in such small doses as are intended only to cover the taste of other remedies, and not to have any action themselves. It has been used in typhus fever, the exanthemata, madness, rheumatisms, and many other diseases. Externally, it is used as a counter-irritant.

Nutmeg and mace are respectively the nut and the investing membrane of the nut of the *Myristica officinalis*, or nutmeg-tree. This is a tree of from twenty to twenty-five feet high, similar, it is said, in appearance to a pear-tree. It is an inhabitant of the Moluccas, especially of the Isles of Banda. The Dutch have endeavoured to confine it to three of the little cluster of the Banda Isles—Banda, Pulo Ay, and Nera. Mace is prepared by separating it from the nutmeg, and drying it in the sun. In this process it loses its rich crimson colour, and acquires a pale cinnamon-yellow hue. The nutmegs require to be more carefully dried, as they are liable to the attacks of an insect. The appearance and properties of nutmegs and mace are so well known, that it is unnecessary to allude to them. They both contain a volatile oil, to which their properties are owing. They are stimulant and slightly narcotic. Hot negus, strongly flavoured with them, is a favourite and useful prescription in a case of slight cold.

Rhubarb is a very useful medicine, which was well known to the Asiatic physicians. It consists of the dried roots of an unknown species of rheum. Six varieties of rhubarb are found in the market. The Russian, improperly termed Turkish, is imported from St. Petersburg, the merchants of this place obtaining it from China. According to the treaty between the two governments, the commerce between the two nations takes place at the frontier towns. Kiatchta is the name of the Russian one, while that of the Chinese is called Maimatschin. It is collected in Tartaria and Mongolia. It is conveyed in sacks upon camels to Kiatchta, where it is inspected by an apothecary, who rejects the worm-eaten parts. It is then forwarded to St. Petersburg. The Chinese or Bucharean merchants do not receive money, but furs, in exchange for it. The reason it is called Turkey rhubarb is, that it is said to have formerly been brought by way of Natolia.

It is imported here in boxes containing a number of cut sections of the root,

of various sizes, of which the lesser are preferred. Their shapes are various, owing to worm-eaten portions having been cut off. The pieces are covered with a yellow dust, which has rubbed off them by their mutual friction during the passage to this country. Beneath the dust the surface has a reddish-white tint, with irregular spots and depressions of a darker hue. The smell of rhubarb is strong and peculiar. When powdered, Russian rhubarb is of a bright yellow colour. It is by far the best variety of rhubarb.

There is another kind of rhubarb called Batavian, imported from China by the Dutch, and which is probably an inferior variety of the Russian kind. A Chinese or East Indian variety, perfectly distinct from this, is imported in large quantities to this country. Its odour is less powerful, its colour duller, and it is less aromatic, both to the taste and smell. Himalayan rhubarb is only known in this country by specimens. English rhubarb is not quite so powerful as Russian, but is, we suspect, extensively used. It is the kind, according to Pareira, which men, dressed up as Turks, sell in the Poultry and Cheapside as "real Turkish rhubarb."

Besides other substances, rhubarb contains a bitter principle—tannin and gallic acids, and oxalate of lime. In small doses it is a stomachic, tonic, and astringent, and in somewhat larger a purgative. It is one of those medicines whose effect may be reckoned on with certainty. It is particularly useful as a purgative for children, and at the commencement of a diarrhoea. It is very common to combine magnesia with it. This combination is known by the name of Gregory's mixture, or powder. As a stomachic and tonic, small doses of rhubarb are often very useful. Occasional doses of it are administered with benefit in scrofulous glandular disease. Combined with ginger in the compound tincture of the pharmacopœia, it is a common medicine, used by the dyspeptic. It has also been used externally as a topical application to indolent ulcers. There are a great number of officinal preparations of rhubarb.

Lavandula vera, common garden lavender, is a well-known plant. It is extensively cultivated in Surrey, and from Mitcham, in that county, the London market is principally supplied. Lavender has an agreeable perfume, which it owes to an essential oil—oil of lavender. Lavender is stimulant, stomachic, and tonic, and is sometimes used in hysteric headache, &c. Its principal use is, however, as a perfume. The following is a good recipe for lavender water:—Take three drachms of oil of lavender and oil of bergamot, one drachm of oil of rosemary, an ounce of honey, two scruples of benzoic, six drops of otto (or rather attar) of roses and of oil of cloves, a couple of grains of musk, and three ounces (two wine-glassfuls) of water. Put these into a common wine quart bottle, and fill it up with rectified spirit. After it has stood some time, it should be filtered.

Belonging to the same natural family as lavender, the labiates, are a number

of plants containing an essential oil, which is carminative and stomachic. Spearmint is one of these, but is not so strong as peppermint—the *Mentha piperita* of botanists. Rather singularly, it was only introduced into medicine in the last century. Mint water is much used as a vehicle for other medicines, and itself is an agreeable carminative and stomachic. It is, as is well known, an ingredient in a very common piece of confectionary—mint drops. There is also a liqueur, sold as a cordial in the shops, which owes its properties to it, and is called peppermint. Peppermint is an indigenous herb. Pennyroyal is a similar herb, more used in domestic medicine than by the physician. Rosemary is another, and from it an agreeable perfume is made, which used to be very fashionable, and which was drank also to relieve hysteria, feelings of sinking, &c. It is prepared by distillation, but may be imitated by mixing four ounces of spirit of rosemary with twelve of the lavender water—the composition of which we have just described. Marjoram, sweet marjoram, and balm, are other examples of the labiates now neglected, although they retain a place in the pharmacopœia, and which used to be extensively patronized by the Lady Bountifuls of rural districts. To these we must add the white horehound; which, however, contains a bitter tonic extractive matter, perhaps in greater quantities than the other labiates.

Foxglove is known to botanists by the name of *Digitalis purpurea*. Although a very common and a very showy flower, it seems to have escaped the attention of the ancient physicians and botanists. Its appearance is well known. The officinal parts are the leaves and seeds. The latter, however, are rarely employed. The dried leaves have a dull green colour, a slight but unpleasant smell, and a bitter nauseous taste. Digitalis contains a principle called digitalina, to which it is supposed its efficacy is owing. The actions of foxglove upon the human economy are very powerful; but, unfortunately, they are uncertain. Generally speaking, it reduces very much both the strength and rapidity of the pulsations of the heart. The consequence of this is, that the vascular system being weakened, absorption goes on much more rapidly; and hence, if dropsical effusion be present, foxglove acts as a diuretic. Some writers suppose that foxglove also acts as a diuretic equally in a state of health. A curious and important fact, connected with the administration of repeated small doses of digitalis, is, that all at once the effects come on. This is called its cumulative effect. In this manner, death has sometimes been induced in the way of syncope. Upon these properties depends the medicinal use of foxglove. It has been employed in inflammations and inflammatory fevers, with a view of reducing the circulation; but in such acute cases it is not of much service. In consumption it was at one time much employed, and many cases of supposed cure have been narrated. It certainly has the power of reducing the frequency of the pulse in this disease; but whether this is productive of any advantage is

another and a doubtful question. In insanity, attended with vascular excitement, it has also been used. But its most important uses are in active hemorrhages, diseases of the heart and great vessels, attended with excited circulation, and in dropsy. In reducing the force and velocity of the circulation in cases of diseased heart, or aorta, it is only secondary in efficacy, when its full action can be produced, to bloodletting, and may often be employed when venesection is out of the question. Of its powerful and salutary influence in dropsy there is no doubt. It is best combined with diuretics.

The natural family *Solanaceæ* contain some important plants, both medicinal and dietetical. We may instance the henbane, nightshade, tobacco, and the potato; the two latter of which were introduced from America by Sir Walter Raleigh.

Henbane, or *Hyoscyamus niger*, was known to the ancients, but was almost introduced into medical practice by Baron Stoeck. It is an indigenous plant, grows on waste grounds, banks, and commons, and flowers in July. There are two varieties of it—one an annual, and the other a biennial. When fresh, the plant has a strong narcotic odour, which is a good deal diminished by drying. Both the leaves and seeds, but the former almost exclusively, are employed in medicine. They contain an alkaloid, hyoscyamia, and an oil. In large doses, henbane is a narcotic poison, producing coma. In small and repeated doses, it has a sedative and tranquillizing effect. It alleviates pain, and tends to produce sleep. It has, so far from a constipating, rather a purgative property. It is an antispasmodic. It is employed instead of opium when that drug disagrees with a person, when it is important to avoid constipation, and in cases of long duration, where opium is losing its effect, or producing disagreeable sensations. Thus it is employed in gout, rheumatism, milk abscess, cancer, neuralgia, colic, &c. It is particularly useful in painful diseases of childhood, as opium is apt, in these tender patients, to excite very dangerous symptoms. It is often added to purgative draughts and pills to prevent spasm.

Atropa belladonna, or deadly nightshade, has been known for a considerable period. Buchanan says that the Scots mixed the juice of this plant with the bread and drink which, by their truce, they were to supply the Danes with; which made them so intoxicated, that the Scots killed the greater part of Sweno's army while under its influence. Shakspeare is supposed to allude to belladonna in *Macbeth*, under the name of the insane root. *Atropa belladonna* is an indigenous herbaceous plant, found in waste ground, upon a calcareous soil; it flowers in June. When bruised, it has a disagreeable narcotic odour. Its taste is bitter. It contains an alkaloid, called atropia. In large doses, nightshade is a narcotic poison, and, in cases of poisoning by it, the muscle of the iris is paralysed, and hence there is a dilated pupil. In medicinal doses, it

is a sedative, antispasmodic, and soporific, and is by some considered to be alterative, especially in chronic glandular disease. It is used in the same class of cases as henbane, and in neuralgia it is thought to be more efficacious than that sedative. As an antispasmodic, it is used in the treatment of whooping-cough by some practitioners. If we wish to dilate the pupil of the eye, without producing any of the constitutional effects of the drug, we rub a little upon the brow, and generally, in a few minutes, the pupil expands, and remains in that state for some hours. Advantage is taken of this by the oculist.

Thorn-apple, or Stramonium, is another medicinal plant of the *Solanaceæ*. Originally a native of America, it has become naturalized in this country, as it is found growing wild. It is an annual, and flowers in July. It is a sedative, and in its actions much resembles henbane, and has been employed in neuralgia, rheumatism, &c. We mention it here, however, because smoking its leaves often gives great relief in asthma. It should, however, be employed with caution in this manner.

Solanum dulcamara, or woody nightshade, is another plant of the same family, having medicinal properties, but which calls for very little of our attention. It is an indigenous shrub, with scarlet, juicy berries, and growing in the thickets and hedges. It is said to possess poisonous properties; but if so, they must be very weak. It has been thought serviceable in chronic skin diseases.

Capsicum annuum, or capsicum, or chilly, as it is sometimes called, is another example of this natural family. It is cultivated in England, but is a native of America. Its dried fruit forms the chilly, or capsicum. It is an acrid aromatic, of a hot and fiery taste. It is much used as a dietetic. In medicine, it is employed as a local stimulant to the mouth and throat, as a gargle, in relaxed conditions of these parts. It is also given as a gastric stimulant in atonic dyspepsia.

An allied plant, *Capsicum frutescens*, yields the capsules called guinea or bird pepper, similar, but hotter and more fiery, than the chilly. This powder is well known by the name of Cayenne pepper. It is used in the same cases as capsicum annuum, and a Cayenne pepper lozenge, for relaxed sore throat, is kept in the shops.

Tobacco is the last plant of this order which demands our attention. The custom of inhaling the smoke of herbs has been practised from a very remote antiquity; and this not only for medicinal purposes, but as an article of luxury. Herodotus says that the Babylonians carried the practice so far, as, in this manner, to become intoxicated. The custom of smoking coltsfoot, in cough, is of great antiquity. In America, the tobacco has probably been the herb fixed upon from a very distant period. At any rate, Humboldt states that it has been cultivated from time immemorial by the inhabitants of Oronooko. Euro-

peans do not seem to have been acquainted with it until the discovery of this continent by Columbus, but the Asiatics probably knew it long before that time.

Hernandez de Toledo, one of the companions of Columbus, introduced it, about 1493, into Spain and Portugal. More than sixty years afterwards, Jean Nicot sent some seeds of the tobacco plant into France. The botanical name for tobacco, *Nicotiana*, was taken from that of this individual. The custom of smoking, or of taking tobacco, as the practice was originally termed, was not prevalent, and perhaps unknown, in England, until the return of Sir F. Drake from Virginia, in 1586, its great patron being Sir Walter Raleigh. The opposition the practice met with from many, and among the rest from King James the First, is well known. It is not, however, so well known that this monarch, without the consent of Parliament, took upon himself to raise the duty upon it from twopence to six shillings and tenpence the pound, the admirers of "the precious stink," as the monarch called tobacco smoke, considering this the most tyrannical act of his lifetime.

The name tobacco is derived from *tabac*, the Caribbean word for pipe, which the Spaniards thus transferred to the herb.

The genus *Nicotiana* contains about forty species, most of which yield tobacco for smoking. They are most of them herbs, rarely undershrubs, and generally covered with down, or hairs. *Nicotiana tabacum* is the kind ordered to be employed for medicinal purposes. It is extensively cultivated in most parts of the world, particularly in America. It is not allowed to be grown in this country. *Nicotiana rustica* is a better variety for the smoker. This was the kind used by Sir W. Raleigh, and is the source of Syrian and Turkish tobacco. *Nicotiana persica* yields the Shiraz variety, and from *Nicotiana repanda* are made the Queen's cigars.

The different kinds of tobacco found in the shops, partly also depend upon difference of cultivation, &c., as well as upon difference of variety. The North American tobacco is the strongest, and from it shag, returns, pigtail or roll, and negrohead, are prepared. The Virginian is perhaps the strongest. The Maryland is milder, and much paler in colour. The commonest variety of it is termed scrubs. Kentucky and Carolina are two other species. From South America are obtained the Havannah and the Cuba kinds. They are principally employed for cigars. Canaster, however, is manufactured in Havannah. Columbian tobacco also makes good cigars. Varinas is imported in rolls, and has, perhaps, the finest flavour of any tobacco. Oronooko, Porto Rico, and St. Domingo, are also favourite South American varieties. The only East Indian tobacco which is thought good is that grown at Manilla, and which is employed for cheroots. More north in Asia, some of the most admired kinds are found—Shiraz, Salonica, and Latakia. The only European tobacco much used in this country is Amersfoot, a Dutch variety.

In Virginia, the seeds are sown thickly in beds of finely prepared earth. When the young plants have a few leaves, they are transplanted into the fields, and set three or four feet apart. This is done in the month of May. They are full-grown in August, when the ripe plants are cut down, and their leaves taken off, packed, and sent to this country in hogsheads.

The duty on unmanufactured tobacco is three shillings a pound, or if grown in our North American provinces, two shillings and ninepence. The duty on foreign manufactured tobacco is nine shillings a pound. Some idea of the consumption of tobacco in this country may be deduced from the revenue produced from it, being three and a half millions each year.

Snuff is tobacco which has been allowed to ferment a little. It is placed in heaps, and sprinkled with water. In this process ammonia is given out. The kind of snuff depends upon the extent to which this process is allowed to go, and also from some kinds, as the Scotch, being principally made from the stalks, while the others are made from the soft part of the leaves.

With the external characters of tobacco every one is familiar. Its constitution is, perhaps, not so clear as could be wished. It contains an alkaloid, called nicotina, and a volatile oil, which latter, probably varying in the different varieties and from culture, gives the different flavours.

In large doses, tobacco is a poison. Its infusion appears to destroy life, by producing paralysis of the heart, and thus syncope; while, on the other hand, the essential oil causes coma and convulsions. Slight instances of poisoning by it, but which merely produce temporary indisposition, are witnessed in individuals who are not accustomed to its use, and who smoke it. The first symptoms are acceleration of the pulse, but the strength of each contraction of the heart is weakened: then there is great faintness and sickness, and muscular debility, and the pulse becomes still weaker and fluttering. The feeling in the pit of the stomach, described as sinking, is often very disagreeable. The surface is covered with cold perspiration, and there is much trembling of the hands. In extreme cases, there are convulsions. Tobacco excites poisonous effects in some individuals much more readily than in others. There are a good many cases on record of poisoning by the infusion of tobacco administered medicinally; and, in one case, the application was external—the head of a boy, who had ringworm, being washed with an infusion of this drug. There are two cases quoted by Dr. Christison, where the cause of death was excessive smoking, seventeen pipes being smoked in one case, and eighteen in the other. But, as has been observed by that author, and as, indeed, must have been remarked by every one, no ill effects have been ascertained to follow the habitual habit of smoking; and if any did exist, it is impossible that they could have remained undiscovered so long.

The reason that tobacco is so universally used, particularly in the form of

smoke, seems to depend upon a most remarkable soothing and tranquillizing effect, which it certainly has over the nervous system.

The power which tobacco possesses of producing muscular debility, is taken advantage of by the physician in those cases where there is tonic muscular contraction. It has been used, and with benefit, in colic, and many medical men have spoken very highly of it in tetanus. Its smoke is used in asthma. It has been tried in hydrophobia, but without any benefit.

Scammony, or an analogous substance, has been known from a very early period, and was used by Hippocrates. It is the concrete juice of the root of the *Convolvulus scammonia*, a plant found in hedges in Greece and the Levant. To obtain it, the earth is dug away from the upper part of the root, into which a cut is made. Under this a shell is affixed, into which the juice flows. The gum from a number of these being collected, it is put into a larger receptacle, and carried in a soft state to Smyrna, where it is most extensively adulterated before being sent to this country. Flour, ashes, sand, and chalk, are mixed with it.

Scammony is a brittle substance, with a slightly acrid taste and a peculiar odour, which has been likened to that of old cheese. It contains a peculiar resin, to which its properties are owing.

Scammony is a powerful and drastic purgative, much and deservedly used in the inflammatory head affections of children. For this, its energy, small dose, and slight taste, especially qualify it.

Jalap is the root of an analogous plant, the *Ipomœa jalapa*, a native of Mexico. It has been used in medicine rather more than two hundred years. It derives its name from Xalapa, a Mexican town, and its only market. The dried roots vary in size from that of the fist to that of a nut. When broken, they are of a deep yellow, interspersed with brown concentric circles. Jalap, like scammony, contains a resin. It is commonly employed as a purgative, resembling, but less active than scammony.

Gentian is the root of the *Gentiana lutea*, an inhabitant of the Alps of Austria and Switzerland. It owes its name and introduction into medicine to Gentius, King of Illyria, who lived about two centuries before Christ. It is a shrub of two or three feet high. The roots are gathered by the peasants of the Tyrol and Switzerland, and imported here in bales. It comes over in little branched pieces, from half an inch to two inches thick. Externally, the root is brown; but internally, it is of a yellowish hue. Its taste is intensely bitter. It contains a volatile odorous matter, and a bitter crystalline one. Gentian root is a pure bitter, without either aroma or astringency. It is extensively used as a tonic in dyspepsia, and in diseases of debility.

Nux vomica, the poison nut, as it is emphatically called, was known to the Arabian physicians. It is the seed of the strychnos. *Nux vomica* is a tree

inhabiting Ceylon and various parts of India. These seeds are round, nearly flat, and about an inch in diameter. They contain strychnia, to which they owe their remarkable properties.

Nux vomica, or strychnia, in very small doses, is a tonic, particularly to the digestive canal. If given in somewhat larger doses, the muscular system begins to be disordered, and in a little the voluntary muscles are thrown into a convulsed state by very slight causes; and, what is very singular, the muscles of paralyzed parts are affected in this manner more than other parts of the same individual which are not paralyzed. In larger, or poisonous doses, strychnia induces the most violent titanic contractions, and, from contractions of the muscles of the windpipe and the muscles of respiration, death by asphyxia. The singular properties of this substance, cause it to be employed in medicine in cases of chronic palsy. It is needless to say, that its use requires great caution.

Olive oil is used for liniments, and therefore deserves a passing notice. It is the expressed oil of the olive-tree—a vegetable known from the most ancient times, and in all ages adopted as the emblem of benignity and peace. It is a large tree of slow growth. The olive oil sent to this country is principally obtained from the south of Europe. Florence oil, or salad oil, comes from Leghorn. Lucca oil is imported in jars. Gallipoli is another variety of olive oil, which comes from Naples. The refuse of olive oil is called sweet oil.

Camomile flowers are more used in domestic medicine than by the physician. They are, however, not without use. They are the flowers of the *Anthemis nobilis*. Two varieties are found in the herb garden—one with single, the other with double flowers. Contrary to the popular opinion, the single ones are the better. They should be dried in the shade. They have a strong and peculiar but agreeable odour, and an aromatic bitter taste. They contain a volatile oil. In very large doses, camomile tea is an emetic; in smaller, it is a pleasant tonic, probably as efficacious as others more in repute. Hot camomile tea is used for fomentations.

Dandelion, or *Taraxacum dens-leonis*, is a well-known vegetable. Its root contains a milky juice, which is employed in medicine. It is given in chronic diseases of the liver.

Valerian is, perhaps, a more efficacious remedy than is commonly considered. It is the root of the great wild valerian, or *Valeriana officinalis*. This is a shrub, from two to four feet high, indigenous, and found in marshy places. The root is remarkable for having a great number of fibres. It has a warm slightly bitter taste, and a peculiar odour, for which cats have an extraordinary fondness. It contains a volatile oil, an acid, and a resin. It exercises considerable influence over the nervous system. The cats who are attracted by its smell become dreadfully intoxicated. It is used with great benefit in all those nervous diseases, found in individuals in whom there is unnatural mobility of

the nervous system, neuralgia of various parts, chorea, hypochondriasis, hysteria, &c. It should be given in full doses, and the powder is the best form for administering it.

Ipecacuanha is the root of the *Cephaelis Ipecacuanha*. The manner in which this valuable drug was introduced into Europe is curious. A young Parisian physician, Helvetius by name, nearly two hundred years ago, attended a merchant of the name of Grenier. On the merchant's recovery, he gave him a drug—some ipecacuanha—which he stated was of great efficacy in dysentery. Helvetius tried it, proclaimed its success, but concealed its name. The daughter, at this time, happened to be ill of dysentery, and the king sent to arrange with Helvetius the price of the discovery of this new remedy. After some successful experiments made with it at the Hotel Dieu, a thousand louis d'ors were paid for it. This Helvetius was the grandfather of the great Helvetius.

Cephaelis ipecacuanha is found in Brazil and other parts of South America. The roots are gathered at all seasons of the year, and as no care is taken to cultivate the plant it has become scarce. It is imported to this country from Rio de Janeiro. The roots are in pieces three or four inches long, about as thick as a quill, and of a knotty appearance. Ipecacuanha has an acrid and bitter, but aromatic taste, and a nauseous, although slight odour. Its colour varies from brown to grey. It contains a peculiar substance called emetina. A substance, exactly resembling it in appearance and properties, is contained in the roots of other plants, besides in those of the *Cephaelis ipecacuanha*. Among these is the root of our common wild violet.

In small doses, ipecacuanha promotes expectoration; in somewhat larger, nausea and sweating; and in still larger, vomiting, which is followed by a tendency to sleep.

As an emetic, ipecacuanha possesses several advantages. It excites nausea, a state of the system often so desirable; but this is neither so intense nor so long as that produced by tartar emetic. It is used as an emetic for weak and debilitated people, when it is necessary to expel the contents of the stomach. Hence it is given in indigestion arising from crude food lying upon the stomach, in hooping-cough, and asthma. Smaller doses are given with advantage in bronchitis, hooping-cough, and asthma. Such are likewise employed, combined with opium, in dysentery, and in the combination known by the name of Dover's powder, in all cases where we wish to excite perspiration.

Cinchona, or Jesuits' bark, is a most important remedy. The history of its introduction into practice is not very clear. It is doubtful if the Indians of South America were aware of its properties before the conquest of their country by the Spaniards. Indeed, in some parts, they were not only ignorant of its use, but ranked it among poisons. Many tales are told of its introduction into Europe. One is, that the wife of the Viceroy of Peru, the Countess of Chinchon,

brought some with her on her return to Europe in 1639; and that, from this circumstance, it derived its names—*cinchona*, and *pulvis comitessæ*, countess's powder. Later than this it was brought to Rome by the Jesuits, and being by them distributed to their various stations, was extensively and successfully used. In this manner it acquired the names—Jesuits' bark, Jesuits' powder, *pulvis patrum*, fathers' powder, &c. After its first success it fell into disuse for some little time, when an Englishman of the name of Talbot acquired great credit in Paris for curing intermittents by a secret remedy. Louis XIV. purchased his secret, which turned out to be the bark in question. Hence it was often called Talbot's remedy, and the English remedy.

The *cinchona* trees inhabit the Andes, from eleven degrees of north latitude to twenty of south. When the dry season sets in, which is about May, the peelers commence their operations, and strip the bark from the branches. They afterwards speedily dry it.

Upon no articles of the *Materia Medica* does so much confusion exist as to the botanical sources of the varieties of *cinchona*, met with in the commerce of this country. No less than twenty-six species of *cinchona* trees are known to exist, each of which probably yields a medicinal bark. To describe these, and to fix the particular kind of bark obtained from each, would be out of the question here, were it possible to do it. But in point of fact, although many volumes, and essays without number, have been written upon the subject, we remain in pretty much the same state of ignorance as we began. The colleges have cut the Gordian knot which they cannot untie, and have put down three species of *cinchona*—the *lancifolia*, the *oblongata*, and the *cordifolia*—respectively furnishing the red, the yellow, and the pale bark of the shops. These three species of *cinchona* undoubtedly exist, and these three varieties of bark are found in our shops; but so far from it being ascertained that the latter are respectively obtained from the former, it is quite certain that they are not.

The pale bark, or crown bark, as it is sometimes called—because it was the kind, of which a supply was furnished to the royal family of Spain, when that country retained her American provinces—arrives in Europe in chests made of slips of wood, roughly fastened together, each weighing two hundred pounds. The pieces of the bark are eight or ten inches in length; some of them are very thin, while others are the tenth of an inch thick. They are singly or doubly quilled, *i.e.* rolled in upon themselves circularly, the quills varying in size from that of a swan's quill to being an inch in diameter. It is of a greyish colour, of little odour, and of a bitter astringent taste. There are several varieties of it—the silver *cinchona*, the *Huamiles*, and others.

The red bark is imported in chests, which contain from a hundred to a hundred and sixty pounds. Most of it is more or less flat, but some pieces are quilled. The quills are sometimes an inch and a quarter in diameter. The

flat pieces are from one to five inches broad, and are occasionally so long as two feet. The colour is of a reddish brown, and the taste is bitter, and more austere than that of the other two varieties.

The yellow cinchona is also brought to this country in chests, and consists of pieces eight or ten inches in length, sometimes quilled, but more generally flat. Its colour is, as its name indicates, yellow. It is more bitter, but less astringent to the taste than the other two varieties. There are several sub-varieties of this yellow bark.

All these kinds are covered with lichens, or other cryptogamic vegetables, and some of these seem to be peculiar to one variety of the bark.

In the year 1820, Pelletier and Caventon announced that they had discovered two alkaloids in cinchona bark—quina and cinchonina; and, nine years later, the former of these gentlemen, in conjunction with Coriol, discovered, in a new kind of cinchona, a third one—aricina. These are most important discoveries, because the properties—or at least the most important properties—of the bark depend upon these alkaloids, which yet vary so much in different specimens, that, if we prescribe bark itself, we never know how strong or how weak our prescription is. Cinchonina is found in greatest abundance in the pale bark, while the quina is most abundant in the yellow. The red bark contains both. Aricina was obtained from a variety of bark called Cusco cinchona.

Besides these alkaloids, bark contains an essential oil; a quantity of tannin, to which it owes its astringency; two peculiar acids, one called kinic, the other kinovic; besides lime, starch, &c.

Quinine is, as every one is aware, now very extensively used in medicine. It is employed in the form of a disulphate. Perhaps the best mode of obtaining it is the following:—Powdered yellow bark, carbonate of soda, sulphuric acid, and animal charcoal, are, in proper proportions, mixed together. The precipitate is collected and dried, and is disulphate of quinine. The theory of the process is this: the carbonate of soda combines with the acid with which the quinine in the plant is combined, and the quinine thus thrown down unites with the sulphuric acid, and forms the required compound. The use of the animal charcoal is to whiten the disulphate of quinine.

This salt is in inodorous delicate crystals of a very bitter taste. Exposed to the air, it effloresces. It is not very soluble in water; but the addition to the mixture of a drop or two of sulphuric acid renders it readily so. It probably possesses all the medicinal properties of the bark, with the exception of its astringency and slight aroma, and its smaller bulk is often a great advantage.

The topical effects of cinchona are astringent. Its constitutional effects are both important and various. A small dose given to a perfectly healthy individual, either produces no symptoms at all, or gives rise to slight disorder of the stomach. A larger one irritates the stomach, brings on nausea, and sets up a

temporary febrile state. But if a moderate dose be given to a person suffering from atonic debility, not dependent upon febrile action, either bark or quinine acts as a powerful tonic, increasing the appetite and the bodily strength. Moreover, if a person be suffering from a disease which remarkably intermits, this remedy, in the great majority of cases, puts a stop to it. It is a tonic and anti-periodic. Probably both these two properties are equally shared in by cinchonia; but its preparation is not so easy as that of quina or quinine, and therefore this alkaloid is not used.

As may be readily supposed, bark is extensively employed by the physician. In fact, whenever we require a powerful tonic, we almost always select it. When the system is much reduced by previous acute illness, and the convalescence does not properly go on, we use it. It is often very serviceable in passive hemorrhages, and when an excessive discharge is being poured from a mucous surface, as sometimes happens in chronic bronchitis, for instance. In all diseases where there are evident symptoms of a broken constitution, it is indicated. It is often prescribed in dyspepsia. It is administered with success in chronic nervous diseases of debilitated subjects.

Then it has often been used in sinking, towards the close of fevers and inflammations. There is no doubt that it is quite safe in such cases; but it is not so certain that it is useful; and it is inferior to the diffusible stimulants—wine, spirits, and ammonia. In chronic scrofulous inflammation, it is very proper to employ it.

In ague, it is our sheet-anchor. It may be given, during the paroxysm, in the interval, or, which is perhaps the best way, at regular intervals, heedless whether the paroxysm be present or not. Some practitioners administer a very large dose before the accession of the fit.

It is not only in ague, but in all intermittent diseases, that bark is so efficacious. Several of the violent neuralgic pains, as hemicrania, and many others, frequently, nay, generally, occur, at well-marked intervals. So, often, does tic-douloureux; so sometimes do hemorrhages; and, in all these, we may expect benefit to follow the use of bark.

Bark was formerly supposed to be efficacious against mortification, and, in such cases, was always administered. Later experience has not confirmed this opinion.

The only topical use to which, we believe, bark is now applied, is as a tooth-powder. Quinine is also used in the same manner.

There are a great number of pharmaceutical preparations of bark, which it is needless to enumerate.

The natural order, *Umbelliferae*, contain several medicinal plants of very variable properties. One section possesses pretty considerable carminative virtues. Of these we may enumerate carraway, *Carum carui*, a plant cultivated

in this country, and used in cooking, as well as in medicine; anise, the fruit of the *Pimpinella anisum*, an herb known to Hippocrates, and introduced into this country about three hundred years ago, but a natural inhabitant of Egypt and the Archipelago; fennel, the *Feniculum vulgare* of botanists, also used in medicine from an early period, and indigenous all over Europe; another variety of feniculum grown in our gardens, and used for garnishing salmon, &c.; and one or two more similar plants. All these are slightly stimulant, antispasmodic, and carminative. Their properties depend upon the essential oil which each contains. They were formerly more esteemed than they now are; and at the present day their use is almost confined to those distilled waters which are used as the vehicles of other medicines.

Asafoetida, or an analogous substance, has been long employed in medicine. It is a gummy resinous exudation from the *Ferula asafoetida*, a plant inhabiting Persia. The gum-resin is obtained by making incisions into the upper part of the root; the cut edges are then scraped, and the obtained asafoetida is exposed to the sun, in masses, to harden. It is sent from the Persian Gulf to Bombay, whence it is exported to this country.

Asafoetida is sent over in irregular pieces of variable size; internally, of a whitish colour and waxy appearance; but, externally, of a pinkish brown. Its taste is bitter and acrid, and its odour strongly alliaceous, and to most people of this country remarkably disagreeable. Others are of a different opinion, and have termed it *Cibus deorum*, food of the gods. In many parts of Asia it is much relished, and used as a condiment, or an ingredient in sauces. Sometimes it is eaten alone. Even here it is sometimes employed in cookery, and the gridiron, upon which a steak is going to be cooked, is rubbed with it, or sometimes, we believe, the plate upon which the meat is going to be placed.

Asafoetida is an antispasmodic, and a very powerful one. It is also a stimulant. It is the best remedy in hysteria which we have, and is often very useful in the convulsion-fits of children, and sometimes even in the epilepsy of adults. In flatulent colic, particularly in that so often met with in hysterical patients, it is a most useful medicine. It is also of value in flatulent distention of the stomach. As a stimulating expectorant in chronic bronchitis, it is often ordered. The only objection to it is its taste; and we are not acquainted with anything that covers it. In flatulence, it is best given along with ammonia. There is an officinal preparation for this, called, truly enough, the foetid spirit of ammonia.

Hemlock, the *Conium maculatum* of Linnæus, was probably the state poison of the Greeks, by which Socrates died. The account, however, of the symptoms witnessed in this philosopher before death, as described by Plato, do not correspond with those usually produced by hemlock. *Conium maculatum* is an indigenous shrub, found in great plenty in all waste grounds, particularly near

inhabited places. The leaves of it are used in medicine. They are collected at the time when the plant is flowering, and are dried in a gently heated stove. When properly dried, they have a fine green colour, and a peculiar smell. They should be carefully preserved from light and air, and kept cool and dry, as they are very liable to spoil, and to become useless for medicinal purposes.

Hemlock, besides other unimportant matters, contains a volatile oil and an alkaloid, *concia*, upon the latter of which its medicinal and poisonous properties depend. Unlike most alkaloids, *concia* is, at ordinary temperatures, fluid.

Hemlock, in large doses, is a poison. Sometimes it would seem to induce coma, while at others, and when the pure alkaloid alone is employed, its action seems to be paralysis of the nerves coming from the spinal cord, and consequent inability to move the muscles of respiration, and therefore death by asphyxia.

In smaller doses, it has been considered an anodyne; but it may be doubtful if its influence extends to more than the motor system of nerves. It has been tried in spasmodic affections; but, rather strangely, without much good being obtained from its use. Indeed, its employment is purely empirical, and it is, and has been, from a very early period, considered to possess an alterative property, and a discutient one over enlargements and indurations of glands. Such enlargements have really, at least apparently, been improved by the use of conium. Very probably the preparations of hemlock are not good; and it is possible that any one using undoubtedly active ones, and carefully watching the results, would obtain a much more definite idea of its properties.

Colocynth is the pulp of the fruit of the wild cucumber, or *Cucumis colocynthis*. This plant is supposed by some to be the wild gourd of the Old Testament. It was known and used by the ancient Greek physicians. It is a plant with a trailing and hispid stem, with a large yellow fruit, with a thin rind, and a very bitter flesh. It is an inhabitant of the Grecian Archipelago, Turkey, Egypt, Japan, &c., and is cultivated in Spain. Colocynth pulp is a light, porous, inodorous, nearly white substance, with a most intensely bitter taste. It contains a bitter matter, to which it owes its properties.

Used in excessive doses, colocynth excites inflammation of the mucous membranes of the intestinal canal; but, in moderate ones, it is a powerful but safe purgative.

Cloves are the unopened or undeveloped flowers of the *Caryophyllus aromaticus*, a tree twenty or thirty feet high, inhabiting the Molucca Islands, and which is also cultivated at the Mauritius, Martinique, &c., although the Dutch attempted to confine it to the first-mentioned place. Cloves contain a volatile oil. Every one is familiar with their appearance and taste. They are used sometimes in medicine as carminatives and stomachics. Allspice is another somewhat similar substance, which has a place in the pharmacopœia.

Almonds are the kernels of the fruit of the *Amygdalus communis*, a tree

which is extensively cultivated in the south of Europe. Almonds have been known from a very remote antiquity, and have, for a long period, been used in medicine. Two varieties are known in the market—the bitter and the sweet almond. The bitter kind comes from Mogadore. There are three kinds of the sweet—the Jordan, from Malaga; the Valencia; and the Barbary, or Italian.

Sweet almonds contain an innocent inodorous oil, a principle called emulsin, analogous to vegetable albumen, and a quantity of sugar, gum, &c. Mixed up along with sugar and gum, in the manner ordered in the pharmacopœia, they make an agreeable emulsion, very useful in tickling cough, and as the medium for administering opiates and expectorants in chronic bronchitis, &c. Bitter almonds, in addition to the above substances, contain a peculiar principle called amygdalin, which, when mixed with water, forms a most poisonous oil, called the essential oil of bitter almonds, and which is strongly impregnated with prussic acid. A single drop of it has killed a cat in five minutes, and many fatal cases have occurred from its use. It is a wonder, indeed, that more do not, for it is much used in confectionary to flavour macaroons, noyau, &c. It is about four times as strong as commercial prussic acid. It was formerly used in medicine, but is now rarely employed. It is, however, of course, applicable to the same cases as prussic acid.

The peach, the plum, and the cherry-laurel tree, belong to the same botanical family as the almond. Cherry-laurel water contains a good deal of prussic acid. It might be used in medicine, and indeed formerly was.

Broom, or *Cytisus scoparius*, is a well-known indigenous plant, growing on dry hills and commons. The tops are used in medicine, and in moderate doses form one of the best diuretics which we have.

Liquorice, the juice of the root of the *Glycyrrhiza glabra*, has been employed in medicine from a very remote period, and is a very familiar domestic remedy. It is an inhabitant of the south of Europe, but is extensively cultivated at Pontefract, and other places in this country. The fresh root is sucked, or made into tea for a demulcent drink; but far greater use is made of the extract. That imported from Spain is called Spanish juice, or, sometimes, black sugar. This, however, is not quite pure. Neither is the professedly refined liquorice sold in pipes. The Pontefract cakes, however, are perfectly so. Sucking these is an agreeable manner of appeasing tickling cough from cold, or slight irritation of the glottis.

Gum is the produce of a number of trees of the acacia species. The Shittah tree of the Old Testament is supposed to be an acacia. Gum, too, was well known to Hippocrates. At least eight varieties of acacia yield the commercial gum of this country, most of them inhabitants of Arabia, the north of Africa, Egypt, India, &c. The plant which yields that variety, known by the name of gum-arabic, is a small tree, although sometimes it attains the height of forty

feet. Gum flows spontaneously from the trunk and branches of these trees, and hardens by exposure to the sun. It is imported from the Levant, Barbary, Senegal, Cape of Good Hope, and other places. It occurs in variable-sized tears, inodorous, semi-transparent, of a sweetish taste, and of a yellowish colour. If pure, it is completely soluble in water. The varieties of it are—Gum-arabic, Senegal gum, Morocco, East Indian, and Cape—the first being the most esteemed. It is a compound of carbon, hydrogen, and oxygen, with, in some specimens, a trace of nitrogen—probably quite accidental.

Solution of gum in water is called mucilage, which possesses emollient, soothing, and demulcent properties. It is used to allay cough, diminish irritation about the fauces, and is a vehicle for other medicines, particularly cough medicines.

Catechu is the product of another variety of acacia, the *Acacia catechu*, an inhabitant of both the East and West Indies. Catechu is the extract of the wood. It is prepared by boiling bits of the wood in water. Catechu is also produced by other trees. A variety of it, or an analogous substance, is called Terra Japonica. The half of good catechu is pure tannin, and it is in consequence a very useful astringent, applicable to all cases where this class of remedies is required.

Senna, the well-known purgative, is the leaf of various species of cassia. It was used in medicine by the Arabians. It is cultivated in Egypt and the adjoining countries, and in the East Indies. Senna has an agreeable fragrant smell, but a nauseous and bitter taste, which, however, is somewhat covered by tamarinds. Senna is an active purgative, and, mixed with Epsom salts, forms the ordinary black draught—a favourite purgative, and doubtless a useful one, at the commencement of fever, &c.

Myrrh is the gum-resin of the *Balsamodendron myrrha*. Myrrh is mentioned in the book of Genesis, and we see that at that early period it was an object of trade with the eastern nations. The Hebrew expression for it is *Mur*, which signifies bitterness. The early Greek physicians used it in medicine. The tree which produces it inhabits Arabia Felix. Myrrh exudes from its bark. It occurs in tears, is of a reddish colour, an agreeable aromatic odour, and of an aromatic, but bitter and acrid taste. It is a mild astringent, and a moderate stimulant and tonic. It is generally combined with chalybeate preparations. Externally, it is used as a tooth-powder, and when the gums are spongy, it is very serviceable. It is also used as a gargle in ulcerated sore throat. It used to be employed as a wash for indolent and foul ulcers.

Quassia, the wood of the *Picræna excelsa* and the *Quassia amara*, is, perhaps, after cinchona, the most valuable vegetable bitter which we possess. The *picræna* is a tall lofty tree, sometimes a hundred feet high, and inhabits Jamaica, from whence it is imported to this country in billets. The wood has

a yellowish tint, no smell, but an intensely pure bitter taste. It contains a peculiar principle called quassite. Upon flies and insects, quassia acts as a strong narcotic poison; but the only resemblance of such an influence over man is, that it certainly often relieves uneasy sensations in the stomach. It is devoid of all irritant, stimulant, or astringent properties, while it is a powerful stomachic and tonic, and is applicable to all cases where tonics are indicated.

Guaiacum wood and resin are the produce of the *Guaiacum officinale*, a native of the West Indies. The wood is vulgarly termed the wood of life, *lignum vite*. It is very hard, and much employed by turners for making rulers and the like. The shavings from the turner's shop are used in medicine. The resin is obtained by wounding the tree, when a copious exudation of it is poured forth. It occurs in tears of a yellowish-green colour, of balsamic odour and little taste.

In large doses, both the wood and resin are acrid stimulants. In small and repeated doses, they certainly seem to have an alterative action, and are sometimes used with benefit in chronic skin diseases, in chronic rheumatism, and in scrofula.

Vitis vinifera, the common grape wine, has been known from the most remote antiquity. We reserve our remarks upon it until we come to treat of DIETETICS.

Gamboge is the gum-resin of the *Hebradendron cambogoides*, a moderate-sized tree, inhabiting Ceylon and Siam. It is obtained by wounding the bark of the tree. Gamboge has a yellow colour, and is employed as a paint; no smell, and an acrid taste. It is a most powerful purgative, and in large doses acts as an irritant poison. It is the principal constituent of Morrison's pills, and has undoubtedly been often, in this preparation, the cause of death. It is, perhaps, not so much employed in medicine as it used to be.

Canella, or wild cinnamon, is the bark of the *Canella alba*, an inhabitant of the West Indies, and other parts of America. It is an aromatic tonic.

To the natural family, *Aurantiaceæ*, or the orange tribe, belong three plants—the citron, the orange, and the lemon—all of which are employed medicinally, and therefore claim a passing notice. The citron has been known for a long period, and some suppose that it is referred to in the Old Testament upon several occasions, when the word is rendered in our translation—apple. The citron-tree is a native of Asia, but extensively cultivated in the south of Europe. The citron itself is a large fruit, which sometimes weighs twenty pounds, of (at least when ripe) a yellow colour. The juice of it, mixed with sugar and water, makes an agreeable drink in fevers, &c. The knowledge of lemon trees was introduced into Europe by the Crusaders. They are now cultivated in the south of Europe. Lemons are imported here from Spain, Portugal, Italy, and the Azores. The peel of lemons contains an essential oil,

and as a grateful stomachic is employed to flavour other medicines. Lemon juice contains a peculiar vegetable acid called citric, and furnishes a most agreeable drink for allaying thirst in febrile and inflammatory complaints. Mixed with sugar and water, it forms the well-known beverage—lemonade. It is also a decided antiscorbutic. Lime juice is almost analogous to that of lemons. There are two kinds of oranges—the bitter and the sweet. Both kinds are grown in the south of Europe, and in the West Indies. Orange flowers contain a most agreeable perfume, dependent upon an essential oil, called oil of neroli. Orange peel is a stomachic, and that obtained from the bitter kind decidedly tonic.

Cotton has been known from a very high antiquity, and employed in the manufacture of cloth. Cotton consists of tubular hairs, which arise from the coat of the seed of the *Gossypium herbaceum*, a tree much cultivated in India, Syria, and particularly in the United States. We mention it here, because the surgeon now almost exclusively uses it in the treatment of burns. All that requires to be done, in such cases, is to put a piece of cotton wad, such as, for instance, is used to pad gowns with, cut in two, upon the burn or scald. This should be allowed to remain undisturbed as long as possible.

Flax, or *Linum usitatissimum*, has been employed in the manufacture of cloth from time immemorial. It is an herb indigenous to this country, and extensively cultivated, both for its fibre for making cloth, and for its seeds, which contain much oil. This oil is obtained by squeezing the seed, the feculent matter left behind being called linseed cake, or oil cake, and which abounds in mucilage. Linseed oil is purgative; but it is very rarely if ever used internally. Mixed with lime water it forms a soap, formerly much used in burns. The infusion of linseed is employed whenever we wish a demulcent medicine; and the meal is used for making poultices.

Horseradish, or *Cochlearia armoracia*, has been long known. It is indigenous in this country, and is extensively cultivated. The root, the pungent taste of which is well known, owes its properties to an essential oil. It is a general stimulant and diaphoretic, and is used in cases of chronic palsy and rheumatism. A little bit chewed in the mouth excites a copious flow of saliva, and this sometimes relieves toothache. It is also a diuretic, and its spirit, or tincture, is added to other diuretic mixtures.

Mustard is well known, and has been employed in medicine ever since the time of Hippocrates. There are two kinds—the black and the white—of which the former is the stronger. Mustard is indigenous, and is cultivated for the table to a considerable extent in this country, particularly in the neighbourhood of Durham. The medicinal uses of mustard are principally two. It is administered internally in large doses, when it excites vomiting, an effect which is pretty certainly produced, and it is applied externally as a counter-irritant.

Employed in this latter manner, it is called a sinapism. It is a mistake to suppose that common vinegar assists its action.

Opium, the most valuable medicine which we possess, is the concrete juice of the unripe capsules of the white poppy, the *Papaver somniferum* of botanists. Its name is derived from *οπίς*, *juice*, signifying that it is *the juice par excellence*. It has been known from the earliest ages. Homer speaks of the cultivation of the poppy, and it is supposed that his *nepenthes* is opium; and Hippocrates certainly employed opiates.

The appearance of the poppy is familiar to every one. It is extensively cultivated in India, Persia, Asia Minor, and Egypt, on account of the opium obtained from it. Before the capsules are ripe, incisions are made into them, when a white juice—to a small extent, however,—flows out from each. This, when hardened, is opium. Several commercial varieties of this drug are found in the shops. Turkey or Levant opium occurs in irregular rounded masses, wrapped in leaves, and, when first imported, of a reddish-brown colour and soft, but, by keeping, it becomes black and hard. It has a strong and unpleasant odour, and a nauseous and bitter taste. It is usually regarded as the best kind. But little Indian opium comes to this country, although a large quantity is produced there. Its principal market is China. It is made up into balls about three pounds in weight. Its colour is blackish brown. Its odour and taste are the same as those of the Levant description. Besides these, there are Egyptian, Constantinople, and British opium. The amount of opium used in this country has of late very much increased, probably owing, to some extent, to the formation of total abstinence societies.

The composition of opium is very complex. It contains no less than four alkaloids—morphia, to which its sedative effect is owing, narcotina, codeia, and paramorphia; two peculiar principles—narceine and meconine—meconic acid; besides a resin, volatile oil, and other unimportant matters. The salt of morphia commonly used is the muriate; and, to obtain it, several processes are made use of. The simplest is to add muriate of lime to a solution of opium; upon doing which meconite of lime and muriate of morphia are formed.

The dried capsules, or poppy heads, as they are commonly called, also contain opium, and are used medicinally.

Taken in large doses, opium acts as a narcotic poison, and brings on coma. We defer, however, the consideration of the poisonous effects of opium.

Taken in a small dose, opium acts as a stimulant; the mind is exhilarated; a peculiar feeling of comfort is felt; muscular strength, as well as a greater desire to use such, is excited; and, above all, the ideas flow with greater facility, rapidity, and clearness. If the mind or body be strongly exercised at this period, no farther effects are felt; but if the person who has taken such a dose remain quiet, in a little he feels his mouth somewhat parched, and he is

inclined to sleep. In a somewhat larger dose, if the person keep quiet, the symptoms of excitement are little witnessed; but the force of external impressions is rapidly diminished, the ideas become confused, there is inability to make any muscular exertion, and sleep, during which there is commonly dreaming, rapidly comes on. Upon awaking, there is generally some thirst and headache and constipation. By repetition, the influence of opium becomes diminished; and therefore its dose requires, if it be taken regularly, to be increased.

This last-mentioned fact is the reason that opium-eaters—that is, those who systematically take opium for the pleasurable excitement which it produces—are obliged to go on increasing the quantity which they take, until the amount becomes most enormous. How long this habit of opium-eating has existed, it is impossible to say. Probably for a very long period. In old oriental tales, we find it used by those who wished to undergo great fatigue, or to abstain long from food. It is yet used by the Tartar couriers, who travel immense distances in a remarkably short space of time. Its effect, when taken for this purpose, is thus described by Dr. Barnes, in his account of Cutch. “On one occasion,” says he, “I had made a very fatiguing night-march with a Cutch soldier. In the morning, after having travelled above thirty miles, I was obliged to assent to his proposal of halting for a few minutes, which he employed in sharing a quantity of about two drachms of opium between himself and his jaded horse. The effect of the dose was soon evident on both, for the horse finished a journey of forty miles with great apparent facility, and the rider absolutely became more active and intelligent.” Owing to the prohibition of wine by the Koran, opium-eating is very common in Turkey and other Mahomedan countries. Physicians travelling in the East have often described the effects of it. Among the more recent of these is Dr. Oppenheim. His statement is as follows:—

“Opium-eaters generally begin with doses of from half a grain to two grains, and gradually increase the quantity, until it amounts to two drachms, and sometimes more, a day. They usually take the opium in pills, but avoid drinking any water after having swallowed them, as this is said to produce violent colic. To make it more palatable, it is sometimes mixed with syrups, or thickened juices; but in this form it is less intoxicating, and resembles mead. It is then taken with a spoon, or dried in small cakes, with the words *mush Allah* (the work of God) imprinted on them.

“The effect of the opium manifests itself in one or two hours after it has been taken, and lasts for four or six hours, according to the dose taken, and the idiosyncrasy of the subject. In persons accustomed to take it, it produces a high degree of animation, which the Theriaki represent as the acme of happiness.

"The habitual opium-eater is instantly recognised by his appearance of total attenuation of body; a withered yellow countenance, a lame gait, a bending of the spine, frequently to such a degree as to assume a circular form, and glossy deep-sunken eyes, betray him at the first glance. The digestive organs are in the highest degree disturbed. The sufferer eats scarcely anything, and his mental and bodily powers are destroyed. By degrees, as the habit becomes more confirmed, his strength continues decreasing, the craving for the stimulus becomes even greater, and, to produce the desired effect, the dose must constantly be augmented.

"After long indulgence, the opium-eater becomes subject to nervous or neuralgic pains, to which opium itself brings no relief. These people seldom attain the age of forty, if they have begun to use opium at an early age. The fasts in the month of Ramadam, are for them fraught with the greatest torments, as, during the whole of that month, they are not allowed to take anything during the day. It is said, that to assuage their sufferings, they swallow before the morning prayer, besides their usual dose, a certain number of other doses, each wrapped up in its particular paper, having previously calculated the time when each envelope shall be unfolded, and allow the pill to produce the effect of the usual allowance. When this baneful habit has become confirmed, it is almost impossible to break it off. The torments of the opium-eater, when deprived of this stimulant, are as dreadful as his bliss is complete when he has taken it. To him night brings the torments of hell, day the bliss of paradise. Those who do make the attempt to discontinue the use of opium, usually mix it with wax, and daily diminish the quantity of the opium until the pill at last contains nothing but wax."

It may be doubted, however, if this account of the ill effects of opium-eating be not greatly exaggerated, if not altogether unfounded. At any rate, in many diseases—as cancer, for instance—we often administer enormous quantities of opium. So much as three pints of laudanum per day has been given. In such cases we do not see these bad effects. Moreover, opium-eating, within the last few years, has become comparatively common in this country, and no ill effects have been observed to proceed from it. According to Dr. Barnes, the natives of Cutch do not suffer from it.

It is well known that Coleridge was an opium-eater. His own description shows the difficulty of leaving off this habit when once it is formed. "For ten years," he says, "the anguish of my spirit has been indescribable; the sense of my danger staring; but the consciousness of my guilt worse, far worse than all.

"I have prayed with drops of agony on my brow—trembling, not only before the justice of my Maker, but even before the mercy of my Redeemer.

"'I gave thee so many talents, what hast thou done with them?'

"Secondly: Overwhelmed as I am with a sense of my direful infirmity, I have never attempted to disguise or conceal the cause. On the contrary, not only to friends have I stated the whole case with tears, and the very bitterness of shame, but in two instances I have warned young men, mere acquaintances, who had spoken of having taken laudanum, of the direful consequences, by an awful exposition of its tremendous effects upon myself.

"Thirdly: Though before God I cannot lift up my eyelids, and only do not despair of his mercy, because to despair would be adding crime to crime; yet to my fellow-men I may say, that I was seduced into this accursed habit ignorantly. I had been almost bedridden for many months with swelling in my knees. In a medical journal I unhappily met with an account of a cure performed in a similar case (or what appeared to me to be so), by rubbing in of laudanum, at the same time taking a given dose internally. It acted like a charm—like a miracle. I recovered the use of my limbs, of my appetite, of my spirits; and this continued for near a fortnight. At length the usual stimulus subsided, the complaint returned, the supposed remedy was recurred to; but I cannot go through the dreary history. Suffice it to say, that effects were produced which acted on me by terror and cowardice, fear of pain, and sudden death; not, so help me God, by any temptation of pleasure, or expectation, or desire of exciting pleasurable sensations.

"On the very contrary, Mrs. Morgan and her sister will bear witness, so far as to say, that the longer I abstained the higher my spirits were, the keener my enjoyment; till the moment, the direful moment, arrived, when my pulse began to fluctuate, my heart to palpitate, and such a dreadful feeling abroad, as it were, of my whole frame; such intolerable restlessness and incipient bewilderment, that, in the last of my several attempts to abandon the dire poison, I exclaimed in agony, 'I am too poor to hazard this.'

"Had I but a few hundred pounds, but two hundred, half to send to Mrs. Coleridge, and half to place myself in a private madhouse, where I could procure nothing but what a physician thought proper, and where a medical attendant could be constantly with me for two or three months (in less than that time life or death would be determined), then there might be hope. Now there is none. O God! how willingly would I place myself under Dr. Fox, in his establishment—for my case is a species of madness—only that it is a derangement, an utter impotence of the volition, and not of the intellectual faculties. You bid me rouse myself. Go bid a man, paralytic in both arms, to rub them briskly together, and that will cure him. Alas! he would reply, that I cannot move my arms is my complaint and my misery."

By far the most graphic account of the sensations produced by opium-eating, will be found in De Quincy's 'Confessions of an English Opium-Eater,' a work to which we refer our readers desirous of investigating this curious subject.

The practice of smoking opium appears to be almost confined to China, where it is extensively practised. The Chinamen do not, however, inhale it for some length of time together, as we do the smoke of tobacco. Small pills of a preparation of it, each about the size of a pea, are prepared for the smoker. One of these being put into the pipe, it is lighted, and consumed in one whiff. The smoke is not puffed out through the mouth, but is ejected through the nostrils. What sensations follow this inhalation of opium do not seem to be very well known. No bad effect, however, appears to follow it.

One of the effects of opium upon the nervous system, is to diminish sensibility in a very decided manner. From whatever cause it may be, opium diminishes the amount of all the secretions of the body, and this very considerably, with the exception of that of the skin. It is a powerful sudorific, and when perspiration is produced by its means, there is often a good deal of itching. Opium, in its primary action, stimulates the circulation; but its secondary and permanent effect is to lessen and soothe its irritability, if any be present.

From these cursory observations upon opium, we pass to the rapid consideration of its uses in disease. In fevers, the tendency to coma is sometimes so strong, that it is impossible to prescribe opium with safety. When this is not the case, and when wakeful delirium and watchfulness are present, or tremor, or diarrhoea, we use, but with great care, opium. In inflammations, it is given after bleeding, usually in this country combined with calomel, as a sedative; and in peritonitis, it is, from the already depressed state of the circulation, almost solely to be depended upon. In reaction, after loss of blood in inflammatory affections, it is our best remedy. In inflammations of the mucous membranes, it is particularly serviceable. In the peculiar inflammations called dysentery, its good effects are often very surprising.

In spasmodic diseases, particularly in chronic spasmodic ones, it is our sheet-anchor. In colic, spasm of the gall ducts, and spasmodic asthma, it rarely fails to give relief. It is more useful in tetanus than any other object of the *Materia Medica*.

In every case where an organ is pouring forth too large a quantity of secretion, which it is desirable we should stop, we may expect to do so by means of opium.

In all diseases in which pain is the predominant symptom, as neuralgia, some cases of cancer, and many others, the relief afforded by opium is very great.

In rheumatism, chronic skin diseases, &c., we also take advantage of its sudorific properties.

Locally, opium is often applied for the purpose of allaying pain. Among its uses in this way, one is, applying a piece to a carious tooth.

Such is a very brief outline of the uses to which opium is applied. There are a great many officinal preparations of it. Syrup of poppies is often used for children; but it should always be remembered, that children are remarkably susceptible of the effects of opium, and that its administration requires great caution. Laudanum is the vulgar name for tincture of opium. There are two other tinctures of it, called Scotch and English paregoric. The former is made by dissolving opium in spirit of ammonia, and adding benzoic acid and saffron. It is principally employed in chronic pulmonary affections. The latter, or English paregoric, is a weak tincture of opium, to which benzoic acid and camphor are added. Dover's powder, as before mentioned, is a mixture of opium and ipecacuanha.

Columba root is the root of the *Cocculus palmatus*, a tree found in the forests of Oiiibo and Mozambique. The root occurs in flat oval pieces of from half an inch to three inches in diameter. It contains a volatile oil, and a bitter principle, to which its properties are owing. It is a mild aromatic tonic, which usually sits very well upon the stomach, and is therefore given in disordered states of the digestive organs, and in convalescence from acute diseases, when the stomach is irritable.

Cocculus indicus, the fruit of the *Anamirta cocculus*, a native of Malabar and some of the East India islands, is but little employed in medicine, but is very extensively used to adulterate beer, notwithstanding the practice is forbidden and punished by heavy fines. It communicates to the beer "an intoxicating quality, which passes for strength of liquor." It is poisonous both to man and to the lower animals, and if some of it be thrown into a pool, the fishes in it soon die. Fish so killed, however, are not considered wholesome. Its medicinal use is as an external stimulating application to chronic skin diseases, but from its poisonous nature it is seldom prescribed for such a purpose.

Monkshood, wolfsbane, or aconite, is the leaf of the *Aconitum napellus*, a well-known plant, cultivated in our gardens. It contains an alkaloid called aconitina, possessing very peculiar properties. The fiftieth part of a grain of this substance will kill a sparrow in ten minutes, and the tenth part of one instantaneously. If a leaf of monkshood be chewed, in a few minutes the lips begin to tingle, and numbness comes on, which remains several hours. When administered internally, in too large doses, it causes death; but from the recorded cases of poisoning by aconite, it is not easy to say exactly in what manner death is brought about. It is not much employed internally in medicine; but, as a topical application, it is the most valuable we have for the relief of neuralgic and rheumatic pains. In some cases, the relief which it affords, especially in cases of neuralgia, is perfectly magical. Occasionally, the pain all at once ceases, and never returns. More generally, however, the pain does return. It is of no use in inflammatory pain.

We will now briefly turn our attention to medicinal substances derived from the animal kingdom.

Common sponge, the *Spongia officinalis* of naturalists, is generally considered to be an animal—of course, very low in the scale of animal being. Many naturalists, however, are inclined to regard it as of vegetable origin. Sponge was known to the ancients. Its appearance is well known. It adheres to rocks immersed under the sea, and when first taken out it has a strong fishy odour. It is found in considerable abundance in the Mediterranean and Red Seas. It is chiefly collected in the vicinity of the islands of the Greek Archipelago. The inhabitants of these obtain it by diving, carrying with them a knife to sever it from the rocks. Like the pearl divers, by long habit they acquire the power of remaining under water a considerable time—one or two minutes without inconvenience.

Formerly, the ashes of burnt sponge were successfully employed in the treatment of Derbyshire neck and enlargement of glands. Its good properties are owing to a considerable quantity of iodine which it contains, and pure iodine is now always used in its place.

Hirudo, or sanguisuga, is the leech. Bloodletting is of two kinds, general and local. General bloodletting is always performed by making an incision into a vein or small artery with a lancet. Local bloodletting is effected by means of leeches, cupping-glasses, and, in children, by making small cuts or scarifications upon the gum. We purpose, in this place, making a few remarks upon local bloodletting.

It is uncertain how long leeches have been used in medicine. In the Proverbs there is this expression—"The horse-leech has two daughters, crying, Give, give." From this it would appear that the animal was known to the Jews in the reign of Solomon. But there is some doubt if the passage—which, as it stands, is not very intelligible—is correctly rendered. The word rendered 'leech' means, according to some, 'destiny;' and the two daughters alluded to are heaven and hell. If the earlier Greek physicians were aware of the existence of leeches, they did not employ them. The first person who we know used them, was Themison. The word *hirudo* is derived from *haurio*, to draw; and *sanguisuga*, from *sanguis*, blood, and *sugo*, to suck.

The leech belongs to the subdivision, Articulata. Its body consists of from ninety to a hundred or more soft rings, which do not increase in number, but in size, as the animal grows older. The back is convex, the belly flat, and the body elongated. It has ten eyes, and its triangular mouth is furnished with sharp-cutting teeth, nearly two hundred in number. The stomach occupies two-thirds of the length of the animal, and is formed of ten compartments, each one giving off a large sac. The intestine is about an inch long. The stomach, intestine, and sacs of a large leech can contain about half an ounce of blood.

These sacs serve as reservoirs of blood, or nutriment for the animal, and it has been supposed that the animal can suck as much at one time as is necessary for its nutrition for two or three years. The leech may live twenty years, and it is not fit for medicinal purposes until it has attained the age of five.

There are several species of leeches. The horse-leech, a common inhabitant of our pools, is erroneously considered to be able to inflict severe wounds upon quadrupeds. The truth is, that its teeth are not able to penetrate the skin of man, or any large animal. It greedily attacks earthworms. The only two kinds used therapeutically in this country, are the *officinalis* and the *medicinalis*. The former is known by having no spots upon it, is an inhabitant of the south of Europe, and is imported to England from Bourdeaux, Lisbon, &c. The latter, or *medicinalis*, has a number of blackish spots upon it, is a native of our own country—where, however, from drainage, it has become scarce—and of the north of Europe, particularly Sweden, whence it is imported in large quantities.

Leeches may be caught with the hand, with a net, by baits—especially the liver of animals—and by the leech-fishers walking with bare legs into the pools, and allowing the leeches to adhere to them. Both these latter methods are objectionable, inasmuch as both render the leech unfit for biting, and the last manner is also very injurious to the men themselves. Leeches are imported either in bags or tubs, care being taken to admit the air to them. The tubs are half filled with water, which is changed every few days in summer, and once a month in winter. Leeches are very liable to epidemic diseases, which sometimes carry off a great number.

The consumption of leeches is most enormous. In Paris alone, three millions are annually consumed; and in the whole of France, probably one hundred millions. More leeches are, however, comparatively, used in France than in this country.

The average amount of blood drawn by a leech, may perhaps be stated at two teaspoonfuls, and as much more, probably, flows from the wound afterwards. Sometimes the animal will not fix. A little cream or blood smeared upon the skin often induces it to do so. After they have fallen off a little, salt is put upon their bodies, which acts upon them as an emetic. Sometimes the bleeding from the wound will not cease, and death has been known to have occurred from hemorrhage from a leech bite. Compression generally causes a coagulum to be formed, and this arrests the bleeding. Rubbing the orifice with lunar caustic in such a case is generally an effectual remedy.

Cupping is another method of locally abstracting blood, which has been employed for a very long period, both in Europe and Asia. It consists of making a number of small incisions, by means of an instrument called a scarificator, and placing over them an exhausted glass, into which, from the pressure of the air upon the adjoining parts, the blood flows. In cupping, an exact

quantity of blood may be taken; if necessary, the blood may be made to flow so rapidly as almost to equal, in the shock given to the system, a general bleeding; there is little fear of after hemorrhage, and the cuts seldom inflame. In all these respects, it is much superior to leeching. On the other hand, it can only be applied to muscular parts, and many people are less afraid of the repeated nips which a number of leeches successively give, than of the sudden and simultaneous operation of the lancets of the scarificator.

Children's gums are scarified by making incisions with a little instrument called a gum lancet. It is practised when the irritation of the growing tooth inflames the gum. Its utility probably depends upon its relieving local congestion, and not, as is commonly supposed, upon its making a passage for the tooth.

The effects of local differ from those of general bloodletting, inasmuch as no sudden and violent shock is produced upon the nervous system, and upon the heart's action in inflammatory effusion, by the rapid and sudden abstraction of the blood stimulating these. In children, indeed, all these effects are produced by leeching; but in adults, except as a subsidiary, local bloodletting is not applicable to acute inflammations, attended with inflammatory fever. But in chronic inflammations, and in local congestions of blood, we see the greatest benefit follow the employment of local bloodletting. It does, to a certain extent, diminish the quantity of blood in the system; but its principal use is to diminish the quantity in some congested part near that portion of the skin which is made to bleed. This is done by the *derivation* of blood to the bleeding surface.

In all chronic inflammations, then, and in all local congestions not dependent upon debility, we employ—and the experience of ages confirms the opinion of its efficacy,—local bloodletting. In acute peritonitis, the depressed state of the circulation often forbids general bleeding, and we trust entirely to leeches. In the local determination of blood to the head, so often seen in the commencement of fever, we apply leeches, and with great advantage, to the temples. In the more active congestion, threatening apoplexy, we take advantage of the more rapid depletion of the cupping glasses. In the congestions of blood which so often attend and aggravate organic disease, nothing gives so much relief as the local, or, indeed, sometimes small general, abstraction of blood.

Leeches have sometimes been swallowed. When the French army entered the deserts which separate Egypt from Syria, the soldiers drank greedily of the muddy water of the pools, which, unknown to them, contained leeches. One of the chiefs of brigade swallowed two, which so weakened him that his convalescence was long and difficult. There is a case narrated of a lady who swallowed one which she was applying to her gum. It excited great pain in the stomach. The physician, remembering that wine is fatal to these animals,

administered some every quarter of an hour. After the fourth dose, vomiting came on, and the leech was ejected dead. Salt and water has a similar effect.

Cantharis vesicatoria, the Spanish fly, or blister-beetle, is an important therapeutical agent. Hippocrates made use of a similar beetle that had analogous properties. The insect in question is of a bright brass-green colour, about an inch in length, and of a nauseous unpleasant smell, and, when alive, foetid, and of an acrid taste. It is an inhabitant of the south of Europe, and also occurs abundantly in Russia. It is occasionally, but rarely, found in England. It lives upon trees. Spanish flies are sometimes simply shaken from the trees upon which they are found, killed by the steam of boiling vinegar, and dried in the sun, or in a stove; and at other times are destroyed by smoking them in the trees with brimstone. The commercial sources of them for this country are Messina and St. Petersburg.

Cantharides contain a peculiar matter called cantharidin, upon which their activity depends.

Except in very small doses, cantharides, taken internally, are a poison. They are, however, very extensively used as an external application, to raise a blister. The efficacy of a blister does not depend upon the amount of serum raised, although this may, perhaps, to a certain extent, be regarded as an excretion; nor upon the amount of irritation which is felt. Its good effects depend upon the derivation of the blood from an inflamed or congested organ to the inflamed skin. The uses of blisters are as counter-irritants in inflammations, and purely as derivations, as when they are applied to the calves of the legs, as in apoplexy; and advantage is also taken of their stimulating effect in the last stages of fever. A new form of blistering tissue, which is paper, or silk, saturated in, we believe, a solution of the acetate of cantharides, is immeasurably superior to the old blistering plaster, both in being more efficacious and cleanly, and also in being free from all heavy or disagreeable odour. The first treatment for a blister is to cover it with cotton.

Coccus cacti is commonly known by the name of cochineal insect. It is an inhabitant of Mexico, where it is carefully cultivated. The dead insects have no smell, a bitter taste, and a fine red colour. Cochineal contains a peculiar matter called cochinillin, or, popularly, carmine, well known as a pigment. This, combined with alumina, forms another very useful pigment—lake. The carmine of the shops is not, however, pure cochinillin. To its manufacture some mystery is attached. Cochineal was once thought to possess a number of therapeutical virtues; but it is now only employed in medicine as a colour for mixture, sometimes to please, or rather cheat, the patient's eye, and more laudably to prevent a poisonous liquid, which is colourless, from being mistaken for water.

Honey and wax are two well-known productions of the bee. This indus-

trious little animal has been known from the earliest ages, and admired for its industry and civil polity. In a state of nature, bees live in hollow trees, but are everywhere domesticated in hives. Honey is not, properly, a secretion, or production of bees, since it is merely obtained by the working bees from flowers. It is put into a peculiar receptacle, called the honey bag, and stored up in the hive. Honey is a strong solution of sugar, mixed with the volatile and odorous parts of the flowers from which it is obtained. In some instances this is of a poisonous nature. The honey of Trebizond has long been famous for its injurious properties. Honey is emollient and demulcent, and is sometimes used in slight attacks of bronchitis, sore throat, &c. It is also used as a vehicle for the application of other substances to the mouth and throat. Wax is a secretion of the bees, and forms the framework of the honeycomb. Its natural colour is yellow, and its odour is very peculiar. To whiten it, it is bleached by exposure to the air. Its use in pharmacy is to form a basis for ointments, all of which are called cerates.

Spermaceti is a fat found in the head of the *Physeter macrocephalus*, great-headed cachalot, or spermaceti whale, a mammal of the whale tribe, inhabiting the Pacific ocean, the Indian seas, &c. In the right side of the nose of this animal, and in the upper surface of his head, is a triangular cavity, called by whalers, "the case." In this an opening is made, and the contents, which are spermaceti and sperm oil, are laded out with a bucket. The spermaceti is carefully separated. When pure, it is a laminated substance, without smell, odour, or taste. It is a compound of carbon, hydrogen, and oxygen. It is emollient and demulcent; but it is principally employed for ointments.

Musk is the secretion of a gland of the *Moschus moschiferus*, or musk animal. This animal probably was not known to the ancients. It is of a grey-brown colour, and about the size of a roebuck, to which animal it is allied. It is very timid in its habits. It inhabits Asia, particularly China, Cochin-China, Tonquin, Tartary, and Siberia. Three kinds of musk are known in the market—Chinese, Russian, and Bucharian; all of which, from the high price, are very much exposed to be adulterated. Musk is well known by its strong and peculiar, and, in small quantities, delicious odour. It is a stimulant and antispasmodic, and has often been useful in hysteria. It has also been used in retrocedent gout and low fevers; but its high price stands in the way of its frequent employment.

CHAPTER VI.

INFLAMMATION.

ALL the febrile diseases are known by the following symptoms:—after some shivering, the pulse becomes quicker, and the heat of the skin greater; some of the functions of the body are altered, and the strength of the system—particularly of the muscular system—is much diminished. The symptoms in the fevers proper, are, as we have seen, the result of specific poisons introduced into the blood, while, in the inflammations, they are dependent upon certain local changes which are going on in the nutrition and circulation of parts of the body. To the important subject of inflammation we now turn our attention.

Inflammation has a most important influence over the economy. It affects every part of the body; it is easily excited, and therefore a common disease. Many of the diseases which afflict man begin with it; many end with it; and there are few of any duration which are not liable to be accompanied by it; and a very large proportion of the total deaths of a community are to be attributed to its evil effects. But not only are the destructive consequences of inflammation such as demand very careful consideration, but its healing tendencies are also very interesting. Inflammation is the means which nature uses to prevent ill consequences, and to restore injured parts. It is by it that wounds are healed; that fractured bones unite; that parts adhere together, when their adhesion is essential to the safety of the individual; and that, in some cases, hurtful matters are cast from the system. A scratch, a deep sabre wound, or a musket wound, are united by its means; and we shall afterwards have occasion to notice many other instances of its healing properties. Inflammation, too, can be excited at will, and its course, when so excited, can be regulated. The surgeon often takes advantage of this; and it is by so doing, that he unites the cleft lip, closes up the fissured palate, or restores the dilapidated nose.

A healthy man, say, falls against glass, and a piece of it is stuck into his arm. In a short time, this part of his arm begins to be painful; then it reddens; swelling comes on, and it feels hotter than other parts of his body, both to the feelings of the individual, and also to the touch of another. The swelling is greatest and densest at the point where the injury was sustained, and is very tender to the touch. These symptoms, we will suppose, go on gradually increasing, and if they reach a sufficient intensity, other signs of disorder are witnessed. The man shivers and feels cold; then feels too hot: these two

states are alternated for some little time, until the increased heat gets the mastery, and the temperature of the whole system is raised. The skin is hot and dry; the pulse is fuller, stronger, and more frequent than common; the patient feels great lassitude, is annoyed by thirst, and his head aches. He feels incapable even of thinking; his sleep is restless; his tongue becomes covered with a white fur, and the various secretions are altered and diminished. This is what is called symptomatic or inflammatory fever.

This state may continue for some little time, and may have various terminations. Supposing the man has had the piece of glass extracted, and proper treatment—and, fortunately, the treatment of inflammation is well known, and its utility strongly marked—in all probability all these symptoms—both those shown at the arm, and those by the system at large—will disappear, and the arm and the system return to their usual healthy state. When an occurrence of this kind takes place, the inflammation is said to terminate in resolution. We need not say that this is its most favourable, and to be desired, termination. In many cases, however, so fortunate a result does not happen. If the glass be not extracted; if the means to abate the inflammation have not been used, or have, owing to the intensity of the inflammation, been unavailing, the symptoms, in some cases, become more intense; the swelling assumes a more pointed form; the skin at the summit of the swelling has a white appearance, and the hard central part becomes soft; and the pain, which has hitherto been of a burning nature, becomes of a throbbing and a darting kind; and at last, if art do not interfere, the skin breaks at the point where we observed the white speck, and a quantity of thick cream-coloured matter is discharged, which we call pus. This is followed by great relief to all the symptoms, and is called suppuration. When the man was suffering in this manner, he would probably be bled. If so, the blood would have presented an unusual appearance. At the top of the crassamentum, the fibrine would be seen by itself forming a greyish layer, technically termed the buffy-coat. Sometimes the edges of this buffy-coat are turned up in an unusual manner, particularly when the inflammation has been intense. To this the name of cupped is applied.

Sometimes the suppuration goes on to a great extent, and the system at large suffers in a peculiar way. In the evening, a febrile state of the system is felt, with thirst and heat of the surface; and towards the morning—generally about four o'clock—a profuse perspiration comes on. This is hectic fever.

The man may, however, be even more unfortunate than this; the symptoms may go on increasing, and the part all round about where the glass entered may die. In such a case the pain ceases, the redness disappears, and the part becomes black, and gives out a most offensive smell. The flesh near to it may begin to die also; and, in this case, the fever changes its type and becomes

typhoid, and very much resembles many of the fevers proper, and which are excited by specific poisons, in its symptoms. The patient becomes feebler and feebler, and his mind wanders, and he mutters nonsense; the voluntary muscles, particularly of his hands and mouth, give involuntary little twitches; his pulse is very rapid, but very feeble; his tongue is dry and brown-black, and if he puts it out it trembles; his teeth and lips are covered with black sordes; his eyes are ghastly, and his countenance damp, sunken, and haggard. This state may continue for some days; and at last, the powers of life being exhausted, syncope comes on, and the man dies.

Such, however, is not a necessary result—the man may recover. The dead part in this case, by means of ulceration, is separated, and comes off from the wound, and is called a slough. Moreover, the cavity is filled up in the way in which we shall afterwards see.

Inflammation manifests itself by pain, heat, swelling, redness, and by the effusion of new products from the blood vessels, which speedily assume the form of coagulated lymph, or of pus. Many experiments have been made upon the translucent animals, with a view to ascertain the changes that take place in an inflamed part. It has been found that, upon the application of a stimulus sufficient to induce inflammation, the vessels are contracted, and the flow of the blood in them accelerated. In a little time an opposite state comes on, and the vessels become relaxed, and the motion of the blood through them becomes slower. This is the period of greatest swelling. The circulation in the neighbouring parts is however quicker, and many little vessels, which were before not visible, now become obvious. Next, the characteristic effusions are seen to exude, chiefly, if not entirely, in the parts where the blood is retarded. At first the effusion is serous, but in a little, part of it assumes a gelatinous consistence, and forms flakes, which become solid, and which is called lymph. In this effused lymph, canals soon form, into which blood is passed from the neighbouring capillaries. In a little they become regular vessels, and the circulation is carried on in them in the same manner as any other part of the body, and it is, of course, equally liable to absorption and nutrition. It is thus that wounds become permanently united, and that inflammation, within due bounds, becomes the grand agent in repairing injuries attended with loss of substance.

Inflammation of the mucous and serous membranes, first merely increases their natural secretions; but in a little, the fluid thrown out becomes thicker, and frequently purulent.

The inflammatory effusions are very liable to absorption, and it is in this manner that the disease often finally disappears. Sometimes, however, the absorption goes on to a greater extent than is requisite for this purpose, and extends to neighbouring parts. In this manner, adjoining substances are

absorbed; and to this process of the excess in inflammation of absorption over deposition, we give the name of ulceration.

These changes always extend, more or less, from the point where they are first seen to surrounding parts before they subside. This spreading of the inflammation does not follow any course of vessels or of nerves, but extends from the original point, as from a centre, equally in all directions.

When the inflamed part is getting well, the stagnating blood is observed to move more freely, and the relaxed vessels begin to contract, until the part returns to its natural state. If, however, mortification is going to come on, the blood ceases to flow at all, and rapid putrefaction, both of the blood and of the effusions, takes place.

Just as we found, when considering the circulation of the blood, that it does not wholly depend upon contraction of the solids, but upon vital affinities between it and parts of the body; so, also, it is impossible to explain the phenomena of inflammation by any mechanical action of the vessels. It would seem that inflammation essentially consists in a local increase of a vital power of attraction existing among the particles of the blood, and between them and the surrounding textures, and with which other vital properties are connected and excited.

It has been remarked, that in the inflammation of external parts, the exclusion of air favoured the formation of lymph, and its presence of pus. This latter substance would appear to be an excretion. Probably during the process of inflammation, as in other vital actions, substances are formed, which, if retained in the system, would act as poisons. At any rate, we know that whenever purulent matter is mixed directly with the blood, the system is poisoned.

Inflammation is excited by mechanical and chemical irritation, and by heat applied to the parts which inflame, and by cold applied generally, or to parts which are distant from those which inflame. It is also excited by certain poisons and contagions taken into the system, but which affect only certain textures, chiefly the skin, mucous membrane, and certain glands. Arsenic, bitter almonds, small-pox, and plague, are instances.

Nothing more rapidly and certainly excites inflammation, than the contact with any serous, cellular, or synovial membrane of the substances which continually pass over the mucous membranes, and which, when touching such, merely excite them to secrete their proper secretions. Air, food, or bile, by accident or disease, touching serous membrane, &c., excite violent inflammation.

Another class of causes act as local irritants in exciting inflammation, but which are applied at some distance from the part where the inflammation is excited. Thus a carious tooth often induces inflammation of the gum, and a carious vertebra of the soft parts adjoining to it. In like manner, inflam-

mation going on to ulceration, often, particularly in young people, brings on inflammation of the lymphatic glands.

It has been found, after the destruction of certain nerves—as, for instance, one of those which supply the eye, and the one going to the bronchi—that the conjunctiva and the living membrane of the lungs become inflamed. In like manner, in palsied parts, where the sensitive nerves have lost their power, or have been much injured in their functions, inflammation is very apt to come on. It has hence been supposed, that injury of sentient nerves is an exciting cause of inflammation; but we before had reason to conclude, that the real effect of section of the nerves going to the eye and lungs, was to deprive the person, or animal, so injured, of the sensation connected with the secretion at these places. The inflammations depend upon the contact of air with the membrane, no longer defended by its mucous secretion. In like manner, the capillary circulation being lessened, in some degree, by the want of sensation in a palsied part, that part is predisposed to inflammation. The same predisposition exists, if the circulation be impeded without loss of sensation.

There are also many cases of inflammation, for which no adequate exciting cause can be assigned.

A state of plethora predisposes to one form of inflammation—the gouty; but to none others. On the contrary, none resist the exciting cause of inflammation so well as those with a vigorous circulation. All the permanent causes of debility remarkably predispose to inflammation. Thus its ravages are greatest among the poor. This fact, although contrary to the general opinion, was, some time back remarked by Laennec, in the case of pleurisy. “*Les pleurises,*” he says, “*les plus grave sont ces des sujets les plus debiles, des cachectiques, des hommes affaiblis par des exces quelconque, par la goutte, le scorbut, le cancer, et surtout par l’age.*”

When the predisposing and exciting causes of inflammation exist in a person, the seat of the disease is often fixed by some assignable cause. Then *local* plethora, or increased action of a particular organ, is often the cause of that organ being attacked with inflammation. Thus the breasts of a nurse are more liable to inflammation than when she is not nursing. In like manner, previous inflammation, facilitating local congestion, often determines the part. The influence of organic disease, and other contingencies, in this respect, can easily be imagined.

Again, the *kind* of inflammation is often observed to be determined by predisposing causes, previously acting upon the body. Thus, hereditary tendency and high living predispose a man to have gouty inflammation, who would, probably, otherwise be attacked by another form; and the hereditary tendency to scrofula, with bad living, exposure to damp, &c., predisposes to scrofulous inflammations, rather than to any other form. Moreover, the kind of inflammation

depends upon a specific property in the exciting cause. Thus heat produces a different inflammation upon the skin to that which bruises or cuts do; and the inflammation excited by the contagious poisons, has always something peculiar and specific about it.

We will now proceed to examine more minutely the local effects produced by inflammation. When inflammation is set up, there is always a strong tendency for it to disappear, although the time when this tendency shows itself may very much vary. Previous to subsiding, it very generally extends itself more or less to neighbouring parts; indeed, very often, its decline at the point where it first appeared is followed by its presence in other and adjoining parts. In some inflammatory diseases, there is a peculiar tendency of distant parts to become successively affected. We have an example of this in gout, and a still more marked one in acute rheumatism. In this class of diseases, we sometimes see the inflammation suddenly leave the part first affected, upon which another is immediately attacked. To this the name of metastasis is applied.

Then with regard to the effusion of serum—this is most distinctly seen in certain inflammations of the skin, as, for instance, in the inflammation excited by the application of a blister, and in the inflammations of serous membranes, in gout, and in inflammation of the lungs. Serous effusion also essentially characterizes dropsies; but the effusion of serum consequent upon inflammation, is always much more limited in extent in inflammations than in this class of diseases, and moreover is quickly followed by other effusions.

The effusion of lymph is most distinctly seen in the deposition of adventitious membranes, which are formed by inflammation between the free surfaces of the serous membranes, as, for instance, those of the pleura. These unite the two opposing surfaces. We also, in violent inflammations of the skin, see much effusion of lymph, and also sometimes in those of the mucous membranes. Croup, for example, is an inflammation of the mucous membrane of the wind-pipe, and in this disease, lymph is poured out in such quantities as actually to form a false membrane, which is the exact shape of the organ. It is by a similar exudation of lymph that the cornea of the eye becomes white and cloudy, that the cellular substance becomes dense and hard, that viscera enlarge, that the interior of the blood-vessels become partially choked up, and that many other important changes take place in the structure of inflamed parts.

It is by this effusion of coagulable lymph, also, that inflamed surfaces are made to unite, as in the case of a cut or wound; that ulcers are healed, and breaches of texture repaired; and in these cases, the lymph last secreted assumes the appearance and qualities of the texture that has been removed. A moderate degree of inflammation and seclusion from the air is necessary for the effecting of this. A different length of time seems necessary in different cases for the organization of the lymph. Sometimes it has appeared to have

taken place in thirty-six hours from the commencement of the inflammation; but, in general, a much longer period is requisite.

Pus is sometimes poured out from an inflamed part immediately after the effusion of serum; but in the majority of cases it is preceded by the deposition of lymph. In this case, the purulent effusion is more or less bounded by the lymph thrown out around it, and in this manner an abscess, as it is termed, is formed. In such an abscess, the pus can be easily felt to fluctuate. In advanced stages of inflammation of the skin and serous membrane, pus is thrown out for a long period, and in greater quantities than the lymph. On the mucous membrane of the air-passage indeed, including the conjunctiva, it is frequently secreted without any previous effusion of lymph. The length of time which an inflammation must run before the appearance of pus, varies very much. It is also important to remember, that the length of time during which it may be secreted is also very variable, and is frequently much prolonged. Neither its amount or duration bears any proportion to the intensity of the inflammation.

When an abscess has burst, and its pus is discharged, the cavity is filled up by depositions of lymph, which subsequently become organized. These depositions are little rounded eminences, the technical name of which is granulations, but the vulgar appellation of which is proud-flesh.

When the pus is not circumscribed by lymph, as happens occasionally in the lungs and in the brain, its effusion, as might have been expected, tends to produce great softening.

The maturation of a small-pox, or the progress of a common abscess, gradually finding its way to the surface, causing the intermediate textures and the skin to be absorbed, illustrate the intensity of absorption in an inflamed part, both of the effused lymph and of surrounding textures. As we mentioned, this absorption sometimes takes place to an excess, and to a greater degree, than is necessary or applicable for any useful purpose, and constitutes the state well known by the name of ulceration. Ulceration takes place with very different rapidity in different textures, and under different circumstances. It is most common on the surface, both in the skin and cellular membrane, and in the mucous membrane of the mouth and alimentary canal, and is always more common in textures recently formed by inflammation than in any of the original textures. Some textures, as we before mentioned, scarcely ever ulcerate, and thus often limit and resist the extension of ulceration. Among these are the serous membranes, the outer coat of arteries, and indeed all fibrous textures.

The causes which seem to favour ulceration, are anything which depresses the circulation, either generally or locally, before or during the inflammation, and anything which irritates the part already inflamed, as, for example, the contact of a foreign body.

The loss by ulceration is restored by granulations, or proud-flesh, of coagula-

ble lymph. In an ordinary ulcer, we very often see going on, at the same time, ulceration and absorption, deposition of lymph and formation of pus. When the deposition of lymph exceeds in amount the destructive absorption, the ulcer closes; when the ulcerative progress is most rapid, and little lymph is effused, the ulcer is called phagedenic; when the ulceration is attended with mortification, it is called sloughing; when the process goes on slowly, the lymph at the base and edge becomes hardened; when the granulations upon the surface are deficient, the ulcer is called callous; and when the granulations are larger than is wanted, and require repressing, we have the fungoid ulcer.

The termination of inflammation in mortification is denoted by the part first inflamed becoming insensible and cold, and the circulation in it completely ceasing. The affected part is usually soft and flaccid, and its colour first becomes purple and then black. The smell proceeding from it is most disagreeable and offensive. Sometimes, particularly when the mortification is very minute, the black colour is absent; and occasionally, as in the mortification of the toes, produced by living upon spurred rye, the mortified parts are hard and dry.

Mortification, the result of inflammation, is seen in the surface, in the mucous membrane of the alimentary canal, in the bones, and occasionally in the peritoneum and lungs. When it occurs in any other viscera, it is the result of inflammation induced by mechanical injury.

Mortification is favoured by any cause which weakens the circulation. Thus it occurs more readily in a depending part, whose position impedes the flow of blood, in parts whose veins are compressed, or where the arteries are diseased. It is to the depressing effects upon the system that we attribute mortification in inflammations produced by the bites of serpents, dissection wounds, a violent injury, severe burns, and the like. A similar result often happens in inflammations of portions of palsied limbs. In the same manner, any inflammation which may attend or follow a contagious febrile disease, when it takes the typhus type, has a great tendency to terminate in mortification. This is seen in typhus, the plague, the worst forms of erysipelas, dysentery, &c.

From the sympathetical connection between the intestines and the heart's action, inflammation of these greatly depresses the circulation; and it will be observed, that these inflammations have a greater tendency to end in gangrene than any other internal inflammation.

In the cases of mortification which terminate favourably, a line is formed around the dead matter, which is hard to the touch, and consists of lymph. At this time there is ulceration set up, by means of which a fissure is formed between the living and dead matter, and the latter becomes loosened and detached. It is a curious and important fact, that the vessels of the part are closed by lymph at the point of separation of the living and dead matter, and thus hemorrhage is provided against in such circumstances.

The pain in inflammations doubtless depends upon the nerves being implicated or pressed upon, and varies, in different cases, from slight uneasiness to the greatest agony. Generally speaking, there is more pain felt in external inflammations, and in those of the serous membranes, than in inflammations of mucous membranes and of the viscera. The reason seems to be, that the most pain is felt in those parts which can yield least. Hence it is very great in inflammations of bones, tendons, and cartilages. There are also great diversities in the nature of the pain. It is of a prickling nature in inflammations of the skin, of a dull aching description in those of bones, is likened to the piercing of a knife in those of serous membranes, and often, as in inflammations of some mucous membranes and of the internal parts of viscera, there is scarcely any pain at all. Generally speaking, it is continuous and pretty uniform, in this respect differing from spasmodic pain. But the diagnostic mark the most to be depended upon between the pain of spasm and inflammation is, that the former is relieved by pressure, and the latter much aggravated.

It is unnecessary to consider the variations of heat, swelling, and redness. They are sufficiently obvious; and, indeed, when inflammation exists in the skin or mouth, so that its appearances may be brought directly under the senses, its diagnosis is easy enough. But when we have to do with inflammation of internal organs, and when the local changes are hid from our view, the case is different. By a careful observation of the symptoms, however, the attentive physician can in general sufficiently discriminate inflammation of any organ or tissue. The symptoms principally to be attended to are those mentioned in Cullen's definition before alluded to—the concurrence of fever with fixed pain in some internal part, and deranged function of some internal organ. Not only does deranged function happen, but the perceptible actions or sensible qualities of the organ are, in inflammation, altered. Great attention has been paid to this of late years, and with the most beneficial results. We owe a great debt of gratitude to the French pathologists, particularly to the great Laennec, for devoting his talents to this investigation. Inflammation of the heart and large vessels not only causes altered function, as manifested by palpitation, &c., but alters the sounds, heard either by percussion or auscultation, in the situation of the heart. In like manner, inflammation of any of the respiratory apparatus not only produces dyspnoea, or difficulty of breathing, but alters the respiratory sounds in such different manners, that we can tell whether it is the substance of the lung, the pleura, or the bronchi that are affected, and also the exact extent to which the disease is going.

We have instances of the altered function of inflamed organs, in the intolerance of light by the inflamed eye, in the perversion of smell from inflamed nostrils, in vomiting from inflammation of the stomach, in stupor from inflamed brain, &c. Sometimes, however, when only a small portion of an organ is

affected, the rest of it so well performs its function, that no alteration or deficiency is observed. Thus there may be partial inflammation of the lungs without dyspnoea, particularly in weakly or aged people, in whom the whole quantity of blood which requires to be arterialized is less than usual. In like manner, we may have partial inflammations of the brain with no derangement of mental function; and facts of this nature are recorded which are incompatible with the doctrines of phrenology.

There are some symptoms in parts adjoining the inflamed part which, nevertheless, distinguish its seat. Thus, in inflamed peritoneum, the descent of the diaphragm, in the act of respiration, gives pain; and, therefore, the breathing is carried on solely by means of the muscles of the chest.

Then there are the sympathetic sensations, and the sympathetic actions. Of the former, are the pain of the right shoulder in inflammation of the liver, pain at the knee in inflammation of the hip joint, pain in the limbs in inflammation of the brain, and many others. Of the sympathetic actions, vomiting is very important. It is excited in an especial manner by inflammation of the brain, and by that of the stomach, liver, bowels, &c. This action is of the reflex kind, and is connected with the sensation of nausea. In the same manner, inflammation of the mucous membrane of the lungs excites coughing.

But by far the most important symptom is the presence of fever. Without it, we sometimes should not be able to make out the existence of the disease at all. Sometimes, indeed, the constitutional disturbance is all that is apparent until after death. The following seem to be the most important observations regarding it.

In ordinary cases, the inflammatory fever begins when the symptoms of the local inflammation have a little manifested themselves, and most frequently its attack is sudden, and is announced by well-marked fits of shivering. These are of importance to observe, for this is the period when the disease is most amenable to treatment. Sometimes, however, the fever commences before any symptoms of local inflammation are present. This has been particularly observed in inflammation of the tonsils and of the breast, parts so situated that it is impossible that inflammation, if existing in them, could escape notice. The degree of the fever varies very much, being commonly more in the young, and in those of a full habit of body and a sanguine temperament, than in the aged, the feeble, and the phlegmatic. It also varies in the same individual according to the seat of the inflammation. Inflammations of serous membranes are, as a general rule, attended by a much higher degree of fever than those of mucous membranes, or of the viscera. Occasionally, the febrile symptoms remain a day or two after the local symptoms have disappeared, particularly in the young and strong. Sometimes the reverse takes place—the fever departs, but

the local symptoms go on; but in such a case we may be certain that they will soon abate.

Inflammatory fever is characterized by a firm, strong pulse, and hot skin; but in some inflammations, as in those of the stomach and bowels, large joints, &c., the circulation is languid, the powers depressed, and the skin cold. We have before had occasion to allude to this connection between these organs and the heart. The same form of accompanying fever is seen in inflammation where a large portion of the nervous system has been injured, when animal poisons have been introduced into the system, and also often in those occurring in constitutions whose nervous system has been injured by drunkenness.

Some of the symptoms of inflammatory fever are altered when certain organs are affected; but the most important is the transition of the fever usually seen when much suppuration and ulceration is going on, into the form termed hectic. This is distinguished by having evening exacerbations, followed by profuse perspirations in the morning, generally about four o'clock. Hectic fever, too, is unattended by delirium, or any affection of the nervous system, until almost at the last stage; and it is, too, extended over a long period, and accompanied by great wasting and debility. Towards its close, a diarrhoea is pretty sure to come on, which is very frequently connected with an ulcerated state of the intestinal canal.

Inflammations vary, and some of these may be classified, and their causes can be assigned. Passing by the varieties of inflammation according to the structure affected, which have before been incidentally alluded to, we may observe, that sometimes inflammation happens without presenting any of its usual symptoms, although the changes that characterize it take place, thus rendering its detection difficult. This variety is termed latent inflammation. It occurs in individuals whose nervous and circulating systems have little excitability. Thus it is more frequently seen in the aged, among whom latent inflammation of the substance of the lungs is not uncommon.

Then we have the varieties called acute, subacute, and chronic, which express the rapidity of progress with which the inflammatory process goes on. In the chronic inflammations the symptoms are less urgent, but tend to the same consequences; and the constitutional affection is less, and indicates more debility than febrile action.

But there are certain inflammations whose effects are always specifically distinct from those of ordinary phlegmonous inflammation. One of these is the inflammation of the skin, to which the term rose, or erysipelas, is applied, and which differs from the inflammation produced at the same place by mechanical irritation. It has a great tendency to spread, and its redness is not nearly so great as in ordinary external inflammation. A great deal of serum is effused, but little or no lymph; and the fever, which often commences two or three days

before the affection of the skin, is frequently of the typhoid form. It sometimes prevails epidemically, and then is liable to be produced in every person who gets a cut or scratch. When erysipelas exists in the surgical wards of an hospital, no operation is safe. Inflammations of a similar nature, *i.e.* effusing much serum, little lymph, and attended by typhoid fever, occasionally occur in the mucous membrane, the serous, the cellular tissue, &c.

Then the various skin diseases are examples, at least for the most part, of specific inflammation. Passing by these for the present, and some others, we will allude to two very peculiar inflammations—the rheumatic and the scrofulous.

The rheumatic is distinguished from ordinary inflammation in many respects. It is preceded by stomachic derangement. It attacks various parts within a short time, and these parts are the fibrous tissues, the synovial membranes, and portions of bone. It is liable to affect both the pericardium and lining membrane of the heart. Then it shifts about from one of these to another, in a manner peculiar to itself, so that when we see it leaving a part, instead of thinking that the patient is cured, we know that it will appear in some other place. Farther, it never leads to ulceration, or deposition of pus, but to serous effusions into the joints, thickening of the fibrous membrane, and, when the membranes of the heart are affected by it, to depositions of lymph. The blood of a person in a severe attack of acute rheumatism is highly charged with fibrine, and the bones, when enlarged by it, contain lithate of soda. Akin to it, and attacking the same textures, is the gouty inflammation, which, however, affects the smaller joints principally, and also in one paroxysm a much smaller number of joints. It is, too, preceded by disordered affections of the stomach, and, during its presence, violent attacks of that organ, chiefly of a neuralgic nature, are liable to come on. It only attacks a certain class of people, those who have a hereditary tendency to it, and who live hard, and take little exercise. Besides, after several attacks, peculiar substances, popularly called chalk-stones, are deposited in the joints. Their nature is analogous to the deposition in rheumatic bones, and they consist chiefly of lithate of soda. From this fact, we are led to infer that these two diseases depend upon the circulation in the blood of a substance destined for excretion.

Scrofulous inflammation is of a very specific character, and, in a practical point of view, is very important. Scrofula is used both to express this peculiar inflammation, and also a certain predisposition to it, which is often also called the scrofulous diathesis. Both of these demand a few general observations.

Scrofulous disease is marked either by peculiarities of the inflammation, or by the formation and subsequent change of certain adventitious bodies, called tubercles. Scrofulous inflammation, as seen at the surface in the lymphatic glands, for example, is not only distinguished by its tediousness, the pain being

little, the heat not much increased, and the colour being more livid than red, but by the discharge being more serous, and mixed with fragments of curdy matter. Ulceration is very commonly set up, and the ulcers are almost always very indolent; granulations do not form in them, and they heal with difficulty.

Tubercles are at first little round grey bodies, of a gelatinous consistence. They are often situated in clusters, which afterwards coalesce and become opaque, and are of the consistence of soft cheese. Then frequently they become softer, first in their centres, and degenerate into purulent matter, with little bits of tubercles floating in it. Sometimes, however, they dry up, as it were, and, instead of thus becoming ulcers, harden into earthy concretions, which may remain inert for life. It is proper to observe, that the ulcers formed by tubercles heal with very great difficulty.

The lungs are the most liable of all the organs of the body to have tubercles deposited in them, and the highest portion of these organs more than other parts. Generally, their ulceration is attended by severe hectic fever, and much debility and emaciation, along with, particularly in young people, great quickening of the pulse.

Scrofulous disease may be excited by long-continued cold, damp, and imperfect nourishment, combined with protracted local irritation; but, in the majority of cases, it only occurs in that class which have the scrofulous diathesis. In persons as yet not affected with any disease, who have this habit of body, the complexion is commonly pale, with a circumscribed spot of redness in the cheek; the skin is particularly soft, the eye has a peculiar pearly lustre, the senses are very acute, and the mental powers highly developed and active, so that children afflicted with this diathesis are usually observed to be precociously talented. It is frequently associated with a florid complexion, and light hair and blue eyes, but occurs in the opposite to these.* In the author's limited experience, he has frequently remarked scrofulous disease in black-haired people of the Celtic race.

In many cases, before any important disease is shown, the presence of the scrofulous diathesis is manifested by slight disease. The upper lip is often observed to be swollen, the glands of the neck also swell, and there is long continued chronic inflammation of the membrane of the nostrils. Ulcers, too, and wounds heal, in such cases, slowly and with difficulty.

In the great majority of cases, this scrofulous diathesis is hereditary. Scrofulous disease is, in a great measure, confined to two periods of life—those between the ages of two and three, and thirty and thirty-five years of age. It is greatly promoted by a low and unnutritious diet, and by exposure to cold and damp. Moreover, an insufficiency of exercise and fresh air predispose to

* This is the description of Laennec. Other observers have described it somewhat differently. The point is of no practical importance.

it; but it is impossible to say to which of the two the evil is to be ascribed, and they are generally coupled with bad food. It is promoted by depression of spirits and languor, and, on the other hand, is counteracted by cheerfulness and moderate mental excitement. Any debilitating cause, likewise, assists in its formation. We may also observe that masons, needle-grinders, and other workmen who are in the habit of inhaling irritating substances, are particularly liable to scrofulous disease in the lungs.

There exists no doubt but that the deposition of tubercle from the blood, often at least, is an inflammatory process, and it seems to occur when the blood is unusually serous and languid in its motion. Under such circumstances tubercle is effused instead of the ordinary lymph, and, unlike lymph, it is not absorbed.

Life is endangered in the various inflammations in different manners. Inflammation of the peritoneum often, from its depressing effects upon the circulation, induces fatal syncope. Inflammation of the mucous membrane of the intestines, and also of the kidneys and large joints, may destroy life in the same manner. Then, when the pericardium is inflamed, the effusions are sometimes so great as to impede the action of the heart. In many cases, death is attributable to the exhaustion of the vital powers by sloughing, suppuration, and ulceration, while the system is, at the same time, unable, from the accompanying fever, to assimilate nutriment, at least to a sufficient extent. In these cases, death takes place in the same manner as in death by fasting. It is in this manner that inflammations of the skin, of internal viscera, of the organs of locomotion, &c., often terminate. In many cases death comes on in the way of asphyxia. Thus, inflammation of the mucous membrane of the glottis sometimes hinders the access of air to the lungs—thus, if both lungs are violently inflamed at once, does life terminate—so also does extensive inflammation of the one induce death, but more slowly—and so, likewise, does effusion into the pleura, and sometimes effusion into the bronchi. Then inflammation within the head often leads to such effusion as to induce coma.

Even when inflammation does not terminate fatally, its consequences are very injurious, by running into and blending itself with other diseases, particularly those which consist in perversion of the nutrition and increase of the exhalation, or, in other words, organic diseases and dropsies. These we shall afterwards have occasion to allude to.

Fortunately, inflammation, particularly ordinary acute inflammation, is decidedly under the control of remedies. First, and foremost, are the antiphlogistic regimen and bloodletting, the object of both being to put the patient into such a state as is most favourable for a spontaneous favourable termination of the disease, and also for the action of remedies. We exclude from the sick man, as much as we can, all stimulants, keep him in bed with a cool tempera-

ture, and allow him no stimulating food or drink.* But from what we have seen of the nature and varieties of inflammation, it is obvious that this plan of treatment is contra-indicated in many cases. Then as to bloodletting, it is of two kinds—general, as when a vein is opened, and local, when blood is abstracted from the capillaries by means of leeches or cupping. The vein usually punctured is situated at the bend of the arm, but sometimes the jugular in the neck is fixed upon. The selection is a mere matter of convenience, or fancy; and the effects of the bleeding, if taken with the same rapidity, are the same, whatever vein be chosen. We are guided in inflammation, with regard to bloodletting, by the state of the pulse. If it be hard, *i. e.*, if the throb of the artery resists pressure made upon it by the finger, we judge it proper. We attend besides to other considerations. Thus, in inflammation of the tonsils, we have frequently high fever and a hard pulse; but we know by experience that it will, without bloodletting, get well of itself, and therefore we do not fatigue and weaken the patient with its use. Again, in acute rheumatism, many physicians are of opinion that bloodletting, although indicated by the pulse, has a tendency to favour the metastasis of the disease to the heart, and hence do not employ it in this disease.

Often we require to use this remedy more than once, and one of the most difficult points in some cases for a medical man to decide upon is, how often to repeat it, and when to stop. Carried too far, and used too late, it is as injurious as in time and due degree it is beneficial. At any rate, if the pulse become more natural, if the fever abate, and if the inflamed part either tend to return to its former condition or to suppurate, we know that we require to bleed no more. Very often, while the stream of blood is flowing, marked symptoms of amendment take place.

It is of great consequence to make a rapid impression upon the patient suffering under many cases of acute inflammation, and to produce a syncope. This is done by making a large orifice in the vein, and placing the individual in the upright position. The reason that syncope comes on under such circumstances is, that the pressure upon the brain is suddenly altered.

Enormous quantities of blood have sometimes been taken with benefit, especially in inflammation of the lungs—as much, indeed, as four hundred ounces; of course, at different times.

We use local bloodletting as supplementary to general, and in trifling cases, and in those disposed to become chronic. In children, a local bleeding acts as a general. Indeed, in the hands of an experienced cupper, the cupping-glasses draw blood almost as rapidly as the lancet.

Many other circumstances mollify and regulate the use and extent to which

* See “Antiphlogistic Regimen,” in Index.

bloodletting should be carried, and which we shall have occasion to allude to hereafter.

Cold, by constricting the relaxed vessels, prevents those congestions of blood so essential to inflammatory action, and hence, in inflammations near the surface, we take advantage of this agent. The usual manner of applying it is by placing an evaporating lotion upon the part. As the evaporation goes on, a quantity of heat becomes latent, and the sensation of cold is felt. Cold is also thought to be beneficial when applied to the head in cases of inflammation within the cranium. Sometimes it is applied to this part of the body by a lotion, but frequently by means of ice. Cold, too, sometimes alleviates the bad symptoms of inflammation of the peritoneum. In all cases where cold is applied, the feelings of the patients should be consulted, and it ought not to be carried to a greater extent than to relieve the sensation of increased heat. In all cases where the inflammation is apt to shift about from one place to another, cold should never be applied, as it is apt to cause the internal inflammation to recede to an internal organ, where its presence is far more alarming and dangerous.

With the exception, perhaps, of *colchicum* in gout, we possess no medicine which, having a sedative effect upon the circulation, is applicable to the treatment of inflammation, and does not also possess a nauseating property. Continental physicians, particularly the Italians, have, however, thought differently. Of this class of remedies—and it is a very important class—the most useful drug is tartar emetic, particularly in inflammation of the lungs. The good effects following its use are often almost magical. Foxglove has a powerfully depressing effect upon the action of the heart; but it is so variable and uncertain, that it is not much employed in the treatment of acute inflammation. In rheumatic inflammation, the *colchicum* seems to procure relief in some measure by its sedative effect upon the circulation.

Purgatives, as derivatives, have a powerful control over inflammations of the brain. In inflammations of the contents of the thorax, they seem to be injurious, particularly when much expectoration is going on. In inflammation of the bowels, they, as may be supposed, do no good, and if carried to any extent, harm.

Vomiting, especially in children, is a remedy in inflammation about the windpipe and bronchia. In adults, too, it is useful in inflammation about the mouth; and we have frequently had occasion to notice its good effects in toothache, or inflammation of the tooth.

As for diaphoretic medicines, they are sometimes useful, particularly towards the close of inflammatory affections. When we come to treat of the inflammations in which they are more especially useful, we shall again allude to them.

When the inflammation has become subacute, and in slow scrofulous inflammation, and in slow inflammation of any kind, we derive great benefit from the

use of counter-irritants. These are—stimulating liniments, mustard plasters, blisters, ointments that bring out a rash, issues, and setons.

After bloodletting, in inflammation of the common kind attended with effusion of lymph, practitioners in this country place great reliance upon the exhibition of calomel and opium in combination. They add the opium to prevent the purgative effect of the calomel, and they believe that the latter drug has a specific power of controlling the inflammatory effusion of lymph, and of thus arresting the inflammation. Something of this kind is actually seen to take place in inflammation of the iris. But the inflammation frequently abates before the specific action of mercury upon the mouth has taken place, thus implying that the system is affected by it; and the good effects of opium in abdominal inflammations are so decided, that it may be doubted if much of the good which follows the exhibition of this compound be not owing to the opium.

These beneficial results, which are produced by the administration of full doses of opium, after bleeding in abdominal inflammations, are very marked. The pain abates, the vomiting ceases, sleep is obtained, and the pulse loses its characteristic debility.

Although demanding great discrimination in their use, stimulants are often absolutely necessary in cases of inflammation. It is, of course, generally towards their close, when the system is sinking from the effects of the inflammation. They may be necessary in any inflammation, but are more frequently so in those of the abdomen, in bronchitis, and sometimes very decidedly so in undoubted inflammation of the substance of the lungs. We have a vivid recollection of a case, in which a man's life was very distinctly saved twice over by stimulants; and upon one occasion of the two, he was suffering from inflammation of the lungs, or pneumonia, as it is technically called. It occurred when we were one of the house physicians to a large hospital, and where, among other duties, we had charge of a fever ward, at a time when a severe epidemic was raging, which was attended by great debility and prostration of strength from an early stage of the disease, and which required stimulants. From a little carelessness on the part of the gentleman whose duty it was to admit the patients, a man was sent to our fever ward, supposed to be labouring under fever, but who in reality had typhoid pneumonia, a disease which certainly, in its external character, very much resembled the existing epidemic. By a still greater act of carelessness on our part, the true nature of the disease was not discovered for two or three days, when it was considered, for several reasons, objectionable to remove him. The man's strength was fearfully prostrated; the inflammation appeared to extend to the diaphragm, and brought on hiccup, and he lay half dead, and hiccuping every few seconds, day and night, for a considerable time. Stimulants were freely administered, and with marked benefit; and, after a

long struggle, he recovered from the pneumonia. He had not been, however, free from inflammation many days, and able to know what was going on round about him, and take a little food, when he was seized with the fever, which he had undoubtedly caught in the ward. The few remaining powers of the system sank from the first, and he lay insensible, and almost in a state of collapse for twenty-one days. During this time his pulse, which was sometimes almost imperceptible, always rallied a little after the exhibition of a stimulant, which was given frequently in the course of an hour. During more than the latter half of the disease, the usual quantity ordered for him in a day was, if we remember aright, sixteen ounces of strong port-wine, mixed with six ounces of spirits, and often at night he got more. At length, to the astonishment of everybody, he got better. Six years afterwards, we were accosted by the individual in the street, and he seemed to be of opinion that stimulants agreed with his constitution, for he was far from being sober. He stated, however, that it was an accidental circumstance, arising from an unexpected meeting with an old friend.

After these general remarks upon inflammation, we will proceed to consider some of the most important individual ones.

CHAPTER VII.

INFLAMMATION OF THE BRAIN IN ADULTS.

THE brain and its membranes are liable to inflammation, and to this malady the name of *phrenitis* is given. The disease may attack very different textures, and different portions, and with very different rapidity and violence; and, moreover, as we might have expected from physiology, injury done to the brain by inflammation, above the medulla oblongata, produces no definite result. Hence the febrile symptoms, and the various modifications of the function of the brain and nervous system, are very various; and it is not easy exactly to pitch upon the symptoms which decidedly characterise this inflammation.

In the best marked cases of *phrenitis*, the first morbid appearances are fever—often, however, of no very high and violent character—shooting pain in the head, intolerance of light and sound, nausea and vomiting, and great uneasiness if the head be raised from the pillow. The pulse is firm, and not quicker, but frequently slower, than natural. All these symptoms are observed, however, when there is no inflammation, as, occasionally, in a common sick headache.

They are followed by others more decidedly characteristic. Delirium comes on, and usually in sudden fits, or there is stupor and loss of recollection, spasm of a sudden and violent nature; the pupil is contracted, the patient squints, paralysis is observed, and he falls into a state of coma. The pulse is remarkable for its variability. One minute it will beat sixty times, and the next a hundred and twenty, and it intermits in all manner of ways. The suddenness of the attacks of delirium and spasm, and their frequent equally sudden disappearance, differ very widely from the gradual manner and the persistence of these symptoms in fever.

When the comatose state has become confirmed,—and it usually does become so in a day or two, if our remedies have no effect—a remarkable change takes place in the symptoms. The headache is no longer complained of; instead of intolerance of light and sound, there is deafness, and often blindness; the pupil is expanded, the wild delirium ceases, and the patient merely mutters indistinct words. The violent convulsions cease, but there is twitching of the muscles and tendons; the countenance is cadaverous and ghastly, cold sweats break out, the breathing is slower and deeper, and each inspiration is accompanied by a snore; the coma becomes profounder and profounder, and at length death ends the scene. This fatal event is sometimes protracted for two or three weeks.

Sometimes the first symptom that has been observed is a general convulsion. In other cases, there is little or no fever, and the headache is more urgent; in others, the fever is greater, and the local symptoms less urgent than is usual; and in others, again, the disease first shows itself by a fit of delirium, blindness, or palsy. Occasionally, it evidently supervenes on chronic diseases of the bones of the head, and in ear-ache.

The appearances seen upon dissection of fatal cases are—effusions of lymph and pus upon the membranes, an abscess in some part of the brain, and softening, with various alteration of colour of the portions of the cerebral substance. This softening may depend upon effusion of serum and pus, but sometimes is, probably, of the nature of mortification. Frequently, these appearances are complicated with tubercular deposits.

The effusions, by the pressure which they make upon the medulla oblongata, quite sufficiently account for the coma.

It is needless to observe, that inflammation of the brain is a highly dangerous disease; and its prognosis, particularly in insidious, complex, or neglected cases, more than doubtful.

Ordinary cases, however, taken in time, are decidedly under the influence of treatment. The remedies on which reliance is to be placed are—bloodletting, purgatives, and the application of cold to the head; coupled, of course, with the vigorous enforcement of the antiphlogistic regimen. The bloodletting should, of course, be general and copious, and local depletion be used as a subsidiary.

Along with the application of cold to the head, it is useful to make the feet warmer than natural, by means of hot water, heated bricks, &c. Cold can be applied to the head in various ways. The hair should be shaved, and great relief often follows the mere doing of this. Cloths, dipped in evaporating lotions, can then be applied. An admirable plan is to put some pounded ice and a little water into an oil-skin bag, and place it upon the head. Another method, and a very useful one, is the pouring a stream of cold water continuously upon the head. This plan, however, requires careful watching. A succession of drops may be made to fall upon the head by means of the little apparatus sold in the philosophical instrument shops, and intended to keep a retort cool, by causing water to fall in drops upon it. The effect of cold, applied in these manners, is frequently of immediate benefit, and the patient often, under its use, ceases to be delirious, and regains his lost senses. Dr. Abercrombie relates a case, in which a strong man, who was in the highest state of maniacal excitement, with morbid increase of strength, defeating every attempt of four or five men to restrain him, and who, after a few minutes' exposure to the douche, was not only effectually calmed, but "thrown into a state approaching to asphyxia." The same eminent physician mentions, that he was called in to a child, who had lain for an hour in a state of complete coma. On his arrival, he found her stretched on her back, motionless and insensible, and with her face flushed and turgid. She was raised into a sitting posture, and a basin being placed under her chin, a stream of cold water was made to pass upon her head. Actually, in a few seconds, she was completely recovered, and the next day she was in her usual health.

In no disease are the good effects of purgatives so decidedly shown as in this disorder, but they must be administered with no sparing hand. Croton oil is the best adapted for the purpose, on account of its activity and small bulk. Great quantities are sometimes given, and with the best results. We are ashamed to say how much we once saw taken by a man suffering from inflammation of the brain, and in whose case we were consulted. When we first saw him, the time for venesection, to any extent, was passed, and he had not been bled, from a curious circumstance. The radial artery of the right arm did not follow its usual course, but its place actually was occupied by a very minute branch. This gave a fallacious impression of the state of the circulation. When we saw him, a small bleeding was tried, but was not borne well, or followed by any good results. He took a great number of croton oil pills with marked benefit, and ultimately, through their use, recovered.

The scrofulous diathesis is a strong predisposing cause to inflammation of the brain, as also habits of immoderate intellectual excitement or mental exertion. It is excited by suppressed evacuations, and by previous irritation and inflammation, especially in the abdomen; perhaps violent passion, and, of course,

external injuries, frequently of a trifling nature. Intense heat sometimes excites it, and long endurance of intense cold has been observed to produce it. Besides these, phrenitis is exposed to the common remote causes of inflammation in general. It is not a common disease.

In the earlier stages, blisters are injurious, from the excitement which they produce, but afterwards are very useful. They may also be applied to the calves of the legs, upon the principle of derivation.

CHAPTER VIII.

INFLAMMATION OF THE BRAIN IN CHILDREN, OR HYDROCEPHALUS.

WATER in the head, or hydrocephalus, in its chronic form, is a dropsy, but in its acute, it is an inflammation of the brain. It occurs principally among scrofulous children, and the annual mortality it causes among such is very great. Probably eight or nine per cent. of the whole number of deaths among children are owing to it.

Previous to the disease manifesting itself, the child may often be observed to be out of health, languid and dejected. He gets also fretful and irritable, and sometimes his gait is rendered a little more unsteady than usual. Like phrenitis, hydrocephalus comes on, in different cases, in different manners, and its symptoms are variable. Sometimes the disease appears to attack the child in a moment, and at once he commences the most violent screaming; at others, it comes on more gradually; while, in a third class, its advances are even more insidious, and we are first apprized of its presence by the appearance of convulsions or paralysis. This last form generally occurs when hydrocephalus supervenes upon the disappearance of some other malady, as measles, scarlet fever, &c.

In the majority of cases, the most important symptoms are, pain of the head, apparently of a very intense nature, of which the child complains much, and which gives rise to loud screams, especially when waking from sleep; nausea and vomiting increased by sitting up, very disturbed sleep, with much grinding of the teeth, frequent and sharp pulse, heat of the scalp, and general fever. The child, too, is annoyed by sound and light, is unwilling to speak, or in any way to be disturbed; but its intelligence is unimpaired. This state may pass off in a few hours, or may last, perhaps, a week.

After this appears a state corresponding to that of the collapse, which we had

occasion to notice in phrenitis. The pulse becomes slower, but irregular and variable; the pupils, which had hitherto been contracted, dilate, and often the child squints, has double vision, or becomes blind. Noises now no longer annoy him, and the loud screaming is changed for a very peculiar moan. Convulsions, too, occasionally come on, and sometimes paralysis. All these symptoms are liable to intermit, and the child often temporarily rallies, and regains his consciousness, but only to relapse in a day or two into its former state. In this respect the disease resembles the phrenitis of the adult, where we, in our last chapter, remarked this of the delirium. During this stage of the malady, the little sufferer is occasionally boring his fingers into his ears or nose. This state of things may last a week or two.

Matters get still worse, the pulse again rises in rapidity; the child, moaning, rolls his head continually from side to side, throwing his hands in the air, or often only one, for the other may be paralyzed. Cold and partial sweats come on, the pulse gets weaker and weaker, and at length the child expires, sometimes in the midst of a strong convulsion. This last stage may be over in a few hours, or may last a week or more.

Upon examining the head after death, a large quantity of serum is found within the cranium, occasionally having shreds of lymph floating in it. The substance of the brain is softer than natural, and very often tubercles are detected. A great many morbid appearances have been found in other organs than the brain after death from hydrocephalus, but this probably happens from this disease occurring almost entirely among scrofulous children.

Hydrocephalus attacks children up to the age of twelve or fourteen, or even later, but it is during infancy that it is by far the most prevalent.

Occurring, as it does, almost exclusively in children with the scrofulous diathesis, any cause which tends to aggravate this—as imperfect nourishment, bad air, exposure to cold, or insufficient clothing—acts as a predisposing cause to hydrocephalus, and, of course, whatever tends to bring scrofulous disease into action may excite it in any predisposed to it. Irritation of some kind can often be traced as an exciting cause. Dentition is a common exciter of it, and one, fortunately, the danger of which can, by proper management, be obviated. An occasional cause is the too sudden disappearance of eruptions. It is unnecessary to detail physical injuries, &c., which may act as exciting causes of it. Too great mental exertion probably sometimes brings it. A German writer tells a strange tale about it being brought on in children whose mothers have been violently alarmed, and says, that many instances of this occurred in Vienna, after its bombardment in 1809. The accuracy of this opinion is, however, very much doubted.

Hydrocephalus is a very dangerous disease. It is, however, particularly in its earlier stages, amenable to treatment. Dr. Watson has collected a number

of cases, treated by different medical men, in which one case in four got better. Bleeding, at an early stage of the disease, is, of course, most important; and, indeed, the treatment is precisely the same as we described in the chapter on PHRENITIS—venesection, application of cold, and the administration of purgatives, of which latter, scammony and calomel are probably the most used, many thinking that the calomel has a specific effect independently of its purgative action.

More might perhaps be done than is, with a view to prevent hydrocephalus. Sending a child, suspected of a tendency to it, to the country, keeping it from all exposure to cold and damp, and endeavouring in every way to foster its general strength, may reasonably be expected to be very useful. Great pains, too, should be paid to the child during dentition. The appearance of the disease, in cases where a discharging surface has been suddenly healed, indicates to us the propriety, in children evidently disposed to have water in the head, of using an issue, or some artificial discharge, at a distance from the brain. The minds of children, moreover, should not be so much forced, as they often are, especially when there is any suspicion of a scrofulous taint.

It is important to remember, that nervous symptoms occur, both in adults and children, which resemble those of phrenitis and hydrocephalus. Such, however, we shall afterwards have occasion to allude to.

CHAPTER IX.

INFLAMMATION OF THE SPINAL CORD.

BOTH the spinal cord and its investing membranes are liable to inflammation, but the symptoms are often very obscure and variable. The technical name for it is Myelitis. In some cases, there is no pain attending it; and in others, the pain is not referred by the patient to the back, but to the extremities of the nerves issuing from the inflamed part, and therefore to the sides, limbs, or abdomen. A very common symptom is a painful sensation, as if a light band were encircling the body. When the disease is situated high up, an annoying feeling of suffocation is frequently complained of. The pain, too, very much partakes of the nature of spasm, and intermits considerably. There is very frequently, also, tenderness of the skin, just over the inflamed part; and hence the common plan of drawing a hot sponge down the back, when inflammation or irritation of the cord is suspected. When it approaches the tender bit, a slight degree of pain is felt.

In some cases these symptoms are preceded by shiverings, and accompanied

by fever, and end fatally in the way of coma; this fatal event taking place from the fifth to the tenth day after the commencement of the disease. More frequently the disease is far more chronic in its nature, and is followed by palsy of one or both of the lower limbs; and it has been remarked that these palsied limbs are very subject to involuntary spasmodic actions. In some instances, of course, when the inflammation has been pretty high up, the muscles of respiration are palsied; and, when this occurs, the individual would die asphyxiated, were it not for the diaphragm. Dr. Watson narrates a case where the cord had been injured by an accident, and where the breathing was entirely diaphragmatic. The man was laid upon his back, and his abdomen rose and fell with every inspiration and expiration. He unfortunately took it into his head that he would like to lie upon his side, and, as he was completely paralyzed, begged of the nurse to turn him. She foolishly complied, and his new position interfering with the free motion of the diaphragm, in a few moments he expired asphyxiated.

The heart's action is sometimes very much depressed, and in some of the severe cases so much so, that death takes place by syncope.

Myelitis is caused by injuries, disease of the vertebræ, and has sometimes been excited by lifting a heavy weight. It has occasionally followed great fatigue, but in many cases it is impossible to assign any cause for its appearance. It is more frequent in the male sex.

The morbid appearances after death are precisely similar to those seen in inflammation of the brain. There is effusion of lymph and pus, and softening of the substance of the cord. Often, too, tubercular deposits are found.

The treatment of the disease is obvious enough. Bloodletting, antiphlogistic regimen, and purgatives are, of course, used in the acute cases; and, should the depression of the circulation come on, stimulants. In the more chronic cases, great benefit often follows the employment of counter-irritants. In the still more chronic, the physician often finds it necessary to relax the antiphlogistic regimen, and to take to the tonic.

A disease which may entrap the incautious into a belief that he sees a case of myelitis, is of very common occurrence, and goes by the name of spinal irritation. In this affection, there is pain and tenderness over the vertebræ, pains are felt in the body and limbs, and there may even be partial but temporary palsy. It is almost entirely confined to females of a nervous and hysterical temperament, and there is, of course, no fever. It may readily be distinguished by attending to the following symptoms. The pain of the organ is altogether out of proportion to the constitutional disturbance; other hysteric symptoms are present; the pain, too, is relieved by the recumbent position; and it frequently jumps about from one organ or part to another, in a manner which is not observed in organic affections.

CHAPTER X.

INFLAMMATION OF THE TONSILS, OR QUINSY.

CULLEN's definition of the quinsy is a disease affecting the mucous membrane of the fauces, and particularly the tonsils, with redness and swelling, and attended by inflammatory fever. He also describes a similar inflammation of a more malignant nature, and attended by typhoid and exanthematous fever. This latter we shall consider when we come to the subject of scarlet fever, and we here confine ourselves to a few remarks upon the quinsy.

In a very slight degree, this disorder constitutes an inflammatory sore throat, which, in a few days, gets well of itself. Before the inflammation in severer cases shows itself, the fever is set up, and this fever is often much more intense than could have been expected from the size of the organ inflamed. The pain upon deglutition is often most intense; so much so, indeed, that the patient will refuse to make the attempt to swallow. Sometimes the swelling is so great as to prevent the passage of food, and occasionally the root of the tongue becomes affected, and the patient can only open his mouth a little way. Upon examining the inflamed parts, all the membrane is seen to be intensely red and injected. The voice is very peculiarly modified, and the speech becomes thick and guttural. The inflammation is attended with exudation of lymph, and, as every one knows, if the disease be protracted, an abscess forms, the bursting of which, and consequent discharge of pus, gives relief.

Cold and wet are the usual exciting causes of quinsy; but many individuals have a strong predisposition to it, and this predisposition has been observed to run sometimes in families.

In some cases, instead of getting well in a few days, as it usually does, the inflammation, particularly in a feeble and languid habit, becomes chronic, and the attendant fever leaves, thus forming the relaxed sore throat, which sometimes, especially in scrofulous subjects, runs on to ulceration.

Generally speaking, this disorder gets well of itself. In severe cases, we may expect relief from the use of purgatives and warm fomentations to the outside. In the more chronic forms, stimulating gargles are of service, and particularly touching the throat once a day with a pencil of lunar caustic. If the system be feeble and languid, of course the tonic regimen is necessary. During the acute stage, relief is often given by inhaling the vapour of hot water.

Sometimes the parotid glands inflame, and when they do, they constitute the

disease familiarly called mumps. The parotid swells, and gives a curious expression to the patient's face. Sometimes both glands are bad at the same time, but more frequently only one, and then, as it subsides, the other begins to swell. Both get better in a few days. Beyond keeping the patient in his room, there is no great occasion for any treatment. It is remarkable that this disease is spread by contagion, and often takes a run through a school or a family.

While considering inflammations of this part of the body, we may mention that, in children, there is a disease, called thrush, which consists of little patches or specks of a white colour scattered up and down the mucous membrane of the mouth and fauces. They are formed by little exhalations of serum under the lining membrane of the mucous tissue. They are accompanied by constitutional disturbance, and, among the rest, by acidity of the stomach. In general, they are not attended by danger, but get well in a few days. Sometimes, however, the local affection runs on to gangrene.

CHAPTER XI.

INFLAMMATION OF THE LARYNX AND TRACHEA.

WE now proceed to make a few remarks upon two other inflammations about the throat, of a much more serious character. That of the larynx is called Laryngitis, and that of the trachea, Croup; and this latter is nearly confined to children.

They are both distinguished by a difficult respiration, the inspiration being protracted and wheezing, the voice hoarse (but in our experience of the disease, altogether lost), and the cough has a husky, ringing crow, which, once heard, can never be mistaken. They frequently prove fatal in a very short time, and they thus terminate by the swelling, or effusion, shutting up the air-passages, and thus producing a state of asphyxia.

There is considerable accompanying fever; pain is complained of about the larynx; the patient's countenance indicates great distress; he begs that the windows may be thrown open; he tosses his arms wildly about; his eyeballs protrude; and every action that he does, or expression that his countenance assumes, indicates the extreme distress which want of sufficient air in the lungs excites.

Independently of the fissure through which the air passes being narrowed by the swelling and effusions, the muscles of the larynx are attacked by spasms;

and this, of course, adds to the mischief. It is from this cause that the difficulty of breathing is observed to be aggravated at intervals.

In croup, it is the trachea which is inflamed; and when death takes place from this disease, it is from this canal being shut up by effusion of lymph, although of a somewhat peculiar character. It rarely occurs past the tenth year, and is seldom witnessed until the child is weaned. When it occurs in very young children, it is almost certainly fatal, and it is always a very dangerous disease.

The exciting cause of these two diseases is cold, accompanied by moisture. Hence it most frequently occurs in moist and low situations, and in wet weather. Dr. Alison has remarked, that it often comes on from the child sleeping in a newly-washed room, and that he has noticed it to happen among the children of the lower orders in Edinburgh on Saturday night, this being the only night in the week in which these people think it necessary to wash their houses. It is very prevalent in some families, and hence it is of importance that they choose a residence free from exposure to damp and cold winds. Croup, too, is very liable to return in a child who has once been attacked by it, but after-attacks are not so severe as the first one.

The treatment of croup was formerly not understood, and out of five attacks four died. Now, however, half recover; and probably more would, were proper treatment adopted in time. From the rapidity with which the effusions take place, the power of venesection, and the other antiphlogistic remedies, is limited to a few hours from the commencement of the attack; but if these means are used at this early stage, the disease is often very satisfactorily arrested. After general bleeding in adults, and local in young children, we, in laryngitis, give calomel and opium; but in croup, we trust to purgatives, &c., and we generally employ calomel and tartar emetic. The warm bath is a useful auxiliary, but we doubt if the indiscriminate use of this, in the early stages of inflammations in children, be not sometimes injurious, by acting as a stimulant.

Even if all these remedies fail, we are not, in all cases, to "give in," and consider the case as hopeless. Death taking place by asphyxia, and the exudation that causes this asphyxia being, in laryngitis, situated high up, by making an artificial opening or cut into the trachea, or the operation of tracheotomy, we let in air to the lungs. In this way, the life of the adult is occasionally saved; but in children, the operation is nearly uniformly unsuccessful, because the inflammation extends so much lower down, and, indeed, very frequently reaches the smaller branches of the bronchi. Watson describes so graphically a case of this operation—as, indeed, he describes every case that he has to relate—that we extract a portion of it.

An old man came into Dr. Watson's ward, in Middlesex hospital, with laryngitis. He was bled, took purgatives, &c., but without any benefit.

"Upon visiting him again the same evening, I found the dyspnoea increased. Each act of respiration was attended with a loud, croupy noise. His countenance was beginning to be anxious and ghastly. He was restless, and his pulse was less firm. Being now convinced that the operation of laryngotomy was the only thing that could save him, and that it could not safely be delayed, I sent to request that Sir Charles Bell would come and perform it. By the time he arrived, the restlessness had increased. The patient was shifting perpetually from one side of the bed to the other, as if seeking some new point of support. His face had become pale, and his lips livid. He spoke with sudden, and, as it were, convulsive efforts, stating earnestly how thankful he should be to have the obstacle to his breathing removed, and pointing to the larynx, as the seat of his distress.

"The ordinary operation, under such circumstances, is by no means an easy one to perform. Its difficulties were well exemplified in this patient. In the first place, he was sitting up: he could not bear to be placed in the recumbent position. Then the dyspnoea caused him instinctively to elevate his shoulders, and sternum, and clavicles to the utmost, so that the trachea was sunk deeply into the thorax, and the larynx was in constant and rapid movement, up and down, with a plunging motion, like that of the piston of a steam-engine. Sir Charles, after some trouble, succeeded in cutting out a piece of the cartilage, for a mere slit did not suffice. It closed tightly during every inspiration, although it was open enough during expiration. At length, when the air was freely admitted, the breathing became gradually easy. I shall never forget the whole spectacle. There sat the poor man, gasping and fighting for breath, his face covered with sweat, and wearing the most anxious expression. By-and-by, what I have called an artificial glottis is opened for him; and presently afterwards, though half a dozen candles (as Sir Charles has himself painted the scene) are held close to his face, to throw light upon the wound, and though the surgeons, their hands smeared with blood, are still busy about his throat, making arrangements to secure the patency of the orifice, the patient falls fast asleep. It was necessary to place an assistant behind him, to prevent his head from nodding forwards, and deranging the apparatus in the wound. Nothing can express more strongly than this fact, the great distress and fatigue which had previously existed, and the perfect relief afforded by the operation."

We once saw the symptoms of laryngitis disappear, after bloodletting and a very large dose of opium; and as the case was somewhat singular, we may relate it. An Irish horse-dealer, after exposure to damp, was suddenly seized with severe illness. He sent for a kind of quack, who kept a small apothecary's shop in his neighbourhood. This person recommended a mustard plaster to be applied to his throat, and sold him some medicine. The horse-dealer, in an hour or two, became very much worse, and again summoned the apothecary,

who was frightened at the state he found him in, and, not knowing what to do, sent off a cab for us. Upon our arrival, we found the patient nearly undressed, with all the windows of the room thrown open, and gasping for breath, in the most violent agony, and making the peculiar noise. His voice was lost, but he wrote upon a piece of paper, that he had pain upon swallowing, and over the larynx; that he was almost choked for want of breath, and that, if something were not done to relieve him, he must die. We ordered him to be bled immediately, and a large quantity was taken before he became at all faint. He was, however, much relieved; but still he had pain, and could not breathe freely. A number of leeches were ordered, and a prescription for some calomel and opium pills was given, of which he was to take one every three hours, until we saw him again in the morning. The man was exceedingly frightened, and begged to know when he would be quite well. We told him, that we hoped, by the time he had finished his box of pills, the disease would leave him. Upon visiting him the next morning, he was fast asleep. In fact, he did not awake until night, and then only for a little time, when he fell fast asleep again. The morning after this we found him quite cured of his laryngitis; and it appeared that, as he had associated his convalescence with the swallowing the box of pills, as soon as we had left him on the night of his seizure, he took half of them; and in about ten minutes, having pondered over the matter, he got up, and took the remainder, making altogether some six or eight grains of opium. But the drug had fairly muddled the man's wits, which at no time were very brilliant, and he behaved for several days in the most extraordinary manner possible. Sometime afterwards he became bankrupt, and this so preyed upon his mind that he became insane; and what was very hard, his friends laid the blame of it upon the "strong medicine" which we had, as they insinuated, improperly prescribed.

CHAPTER XII.

AUSCULTATION AND PERCUSSION.

WE formerly mentioned that the sensible qualities of parts were often altered by disease. Some of these alterations, which are appreciable to the sense of hearing, afford such valuable diagnostic signs in diseases of the chest, that, before proceeding farther, we will devote a little time to consider the physical signs, as they are termed, of diseases of the lungs and heart. Indeed, until

the last half century, it was impossible to discriminate between many diseases of these organs. When inflammation attacked the lungs, the physicians formerly could not pronounce whether the pleura, the substance of the lungs, or the mucous membrane of the bronchi, was implicated. This was of great practical importance, for inflammation of the pleura, like that of serous membranes in general, demands, and is benefited by, large abstractions of blood, which are not required in inflammation of the bronchi; and inflammation of the substance of the lungs so remarkably abates under the use of tartar emetic, that this drug has by many been considered a specific. The presence of tubercles, too, could not be certainly ascertained by any symptoms known to former physicians, and, what is perhaps of more consequence, they could not, in many cases, be certain of their absence when they really were absent. Now, however, we can diagnose diseases of the contents of the chest more accurately and decidedly than those of any other part of the body—actually even more so than those of the skin. We have only, however, been able to do so since the two little instruments, the stethoscope and the percussor, or auscultation and percussion, have been introduced. It is by attending to the modifications which disease produces in the sounds of the chest, that this great improvement in practical medicine has been effected.

That the ear might be used with advantage in forming an opinion of the nature of the changes going on in the diseased chest, seems to have been known to Hippocrates. Indeed, it is remarkable to observe how the elementary idea, as it were, of many future discoveries in medicine is hinted at by this early writer. For two thousand years, however, the hint of Hippocrates was not attended to. Hooke, a countryman of our own, and not belonging to the medical profession, perceived the advantage that might be made of the sounds of the chest, and even hints at the possibility of finding artificial means to assist the ear. His observations are so remarkable that we will quote them:—"There may be a possibility," he says, "of discovering the internal motions and actions of bodies by the sounds they make. Who knows but that, as in a watch, we may hear the beating of the balance, and the running of the wheels, and the striking of the hammers, and the grating of the teeth, and multitudes of other noises? Who knows, I say, but that it may be possible to discover the motions of internal parts of bodies, whether animal, vegetable, or mineral, by the sounds they make; that one may discover the works performed in the several offices and shops of a man's body, and thereby discover what engine is out of order, what works are going on at several times and lie still at others, and the like? I have this encouragement not to think all these things utterly impossible, though never so much derided by the generality of men, and never so seemingly mad, foolish, and fantastic, that, as the thinking them impossible cannot much improve my knowledge, so the believing them possible may perhaps be an occasion for taking

notice of such things as another would pass by without regard, as useless. And somewhat more of encouragement I have also from experience, that I have been able to hear very plainly the beating of a man's heart, and it is common to hear the motion of the wind to and fro in the guts, and other small vessels; the stopping in the lungs is easily discovered by the wheezing. As the motion of the parts one amongst another, to their becoming sensible, they require either that their motions be increased, or that the organ be made more nice and powerful, to sensate and distinguish them as they are; for the doing of which, I think it is not impossible but that in many cases there may be helps found."

About a century after this was written, a German physician, by name Avenbrugger, fell upon the plan of striking the chest, and from the sounds he thus elicited, judging of the state of its contents. Little attention was, however, paid to this plan of percussion, as it is termed, until Corvisart, the famous French physician, took up the matter about forty years ago. Since then, this plan of investigating disease has been brought to great perfection. Percussion may be performed by tapping the surface with the finger, or, as is more generally done, by tapping some solid substance laid upon it. A very common plan is, for the physician to place a finger of his left hand upon the part he wishes to examine, and to strike it with the ends of the two first fingers of the right hand. The practice of percussion is based upon the fact, that when an elastic substance, as the lungs, when healthy, is struck, a clear or resonant sound is given out, while a denser substance, as diseased lungs often are, gives a dull or non-resonant sound. In other words, it is a test of the elasticity or denseness of the contents of the thorax. Now, we can easily understand, from what we have already seen of the nature of disease, that the sound elicited from many portions of the thorax will be duller than natural. If, in inflammation of the substance of the lungs, lymph is effused, we have a dull sound, and the same in any portion where tubercles are deposited. The pleura may secrete serum, or lymph, or pus, and thus present an obstacle to the resonance of the chest. On the other hand, any cause which dilates the air cells or bronchi of the lungs, will cause a clearer sound to issue out when the chest over them is percussed. But useful as percussion is to the practitioner, still more minute knowledge is obtained by means of auscultation.

Corvisart's pupils paid great attention to the results obtained by percussion. Sometimes, however, they met with cases in which it afforded them little benefit, and they were then accustomed to apply the ear to the chest, but for some little time in a rather vague and indistinct manner. A little more than thirty years ago, the great Laennec began to use a stethoscope for such examinations, and being a man not only endowed with ingenuity to invent new contrivances for the investigation of diseased actions, but with a facility and acute-

ness of observation and a power of generalization seldom if ever equalled, he brought, in the course of a very few years, this most useful art of auscultation almost to perfection. The following is his own account of the discovery:—"In the year 1816," he says, "I was consulted by a young woman affected with the general symptoms of diseased heart, and in whose case percussion and the application of the hand were of little avail, owing to her being extremely stout. The immediate application of the ear being inadmissible for obvious reasons, I happened to recollect a simple and well-known fact in acoustics, and fancied it might be turned to some use on the present occasion. The fact I allude to is the great distinctness with which we hear the scratch of a pin at one end of a piece of wood upon applying our ear to the other. Immediately on this suggestion, I rolled a quire of paper into a kind of cylinder, and applied the end of it to my patient's chest, and the other to my ear, and I was not a little surprised and pleased to find that I could thereby distinguish the action of the heart in a manner more clear and distinct than I had ever been able to do by the immediate application of the ear. From that moment I imagined that means might be found to ascertain the character, not merely of the action of the heart, but of every species of sound produced by the motion of all the organs within the chest."

To this little instrument, thus discovered by Laennec, the name of stethoscope is given, and it has probably been the means of more lives being saved than any other modern discovery, with the exception of vaccination. We will rapidly run through the various sounds which, by its assistance, we can distinguish. We before alluded to the natural respiratory murmur produced by the air striking against the air tubes. If this is not to be heard over any portion of the lungs, we infer that such portion is condensed and useless, and in such cases we have the other parts of the lungs doing extra duty, and the murmur in them louder than natural. This latter is called puerile respiration. If a bronchus communicate with a hole in the lungs, a very peculiar modification of it is heard, to which the names of cavernous and amphonic are given. Then, if the motion of the air be resisted by any cause, the murmur is altered, and is called a rale or ronchus. If the impediment is solid, we have a dry rale; if liquid, a moist one. Of the first kind is the sibilant or whistling, which is caused by the calibre of the air tube in which it is heard being lessened, either by inflammation, as is the case in inflammation of the bronchi, or by spasm, as occurs in asthma. A deeper rale is called the sonorous, and is produced by an obstruction having a flattened aperture, as partial swelling of the tube, or a bit of tough mucus in it. The moist rales are produced by the bubbling passage of air through liquid. They differ in loudness according to the size of the bronchi. The mucous rale is heard in bronchitis, and is caused by the passage of the air through the larger bronchi; and the crepitant rale, which is justly compared to

the crackling of salt upon the fire, by the passage of air through the smallest air tubes, occurs in inflammation of the substance of the lungs. Intermediate between these two are the submucous and the subcrepitan—terms which require no explanation.

The sounds of the voice are likewise much modified by disease. Upon applying the stethoscope to the chest of a healthy individual, and causing him to speak, the sound of his voice is found to vary according to the exact part of the chest we place the instrument upon. If we apply it to the upper part of the sternum, it is heard so loud that it seems as if spoken into the ear. But when heard over the divisions of the large bronchi, the articulation is less distinct, and the sound of the voice more diffused and distant; this is called natural bronchophony. In the other parts of the chest, the vibrations of the voice are altogether lost, or, at most, there is an obscure diffused murmur. Now, if some part of the pulmonary texture, as the summit of the left lung, for instance, by the deposition of tubercles, become denser, its power of conducting sound is increased, and upon listening with a stethoscope while the person is speaking, we have an unnatural bronchophony. This is a most important sound.

The voice, as heard through a stethoscope, is still more strangely altered when a thin layer of fluid lies between the lungs and the pleura. The fluid is thrown into a series of small vibrations, which make the voice somewhat resemble the bleating of a goat. To this modification, Laennec applied the term *ægophony*.

When a cavity is formed in the lungs by the bursting of an abscess or a vomica, as the one produced by the softening of tubercles, the sound of the voice resembles that heard over the larynx, and seems not only to be passed through the chest, but actually to originate in the abscess. This is *pectoriloquy*.

Such are the principal acoustic phenomena connected with the lungs. Let us now as rapidly run over those of the heart.

The natural sounds of the heart are, as we have before mentioned, two in number: the one, technically called the first sound, duller and more prolonged, and accompanying the contraction of the ventricles; and the other, or second, sharper and quicker, and caused by the tilting of the blood against the semilunar valves of the aorta and pulmonary artery. With regard to the morbid sounds, we may first observe that these two may become so much increased in intensity as to become such. Then the second may be lessened or obliterated by disease of the semilunar valves. Either sound may be accompanied by a sound which very much resembles the blowing of bellows, and is called a *bruit*, and which sometimes has a rough, rasping sound. If a *bruit* occur during the first sound of the heart, *i.e.*, if it be heard during the contraction of that

organ, it depends upon one of two causes—either some of the orifices from the heart are narrowed by disease of the valves, or the blood flows preternaturally fast through them. If the diseased valve be rough, then it is that we may expect to hear the rasping sound. When accompanying the relaxation of the heart, it generally depends upon the valves being diseased, thus allowing a quantity of blood to regurgitate.

By means of percussion, we also can ascertain the extent of the heart, and if it occupy too great a proportion of the thorax, either from its own enlargement, or the effusion of fluid into the heart's purse, and the extent of its increase. It is not very easy, however, to do this with great exactitude.

Auscultation and percussion are applied to the diagnosis of the diseases of other organs besides those of the lungs and heart. The most important of these are some disorders of arteries, and the enlargement of internal viscera.

CHAPTER XIII.

BRONCHITIS.

INFLAMMATION of the mucous membrane of the bronchi is a very common disease, and is perhaps the one which most frequently follows exposure to cold and wet. It varies very much in intensity in different attacks, being sometimes a dangerous disease, and at others merely the trifling complaint, called a cold in the breast. It is very often, too, complicated with other diseases, as with spasm in whooping-cough and asthma, and it also sometimes occurs epidemically, constituting the influenza.

A common cold, as it is called, whether of the mucous membrane of the nose, frontal sinuses, &c., or that of the bronchi, usually begins with shivering, and the pulse indicates a slight febrile action. The membrane is dry and irritable, and if the cold be in the head, there is often violent sneezing. In a little the secretion is restored, or rather increased, and in a day or two "the cold" takes its departure. Usually, all that is required in this slight affection is keeping by the fireside. A dose of opium, taken upon the very first appearance of the disorder, will, however, generally entirely check it. Notwithstanding that it is contrary to theory to exhibit stimulants when febrile symptoms, even of a slightly acute nature, are present, yet there is no doubt but that the domestic remedy, some hot punch, very frequently cuts short a cold. People very liable to colds often do themselves harm by being always too

warmly clad, and by "coddling" themselves too much. The best preventive is the daily use of the cold or tepid shower bath, or aspersion of tepid or cold water.

To this slight inflammation, however, of the mucous membrane of the bronchi, it is not usual to apply the term bronchitis. Occurring in a more severe form, it sets in with rigour, the patient is hoarse, he has some little difficulty of breathing, headache, and thirst, and pain in the chest, usually stated to lie under the breastbone, and of that particular kind to which the name rawness is applied. There is cough, but at first unattended with any expectoration, and during the cough the pain is increased. When listening to the sounds of the chest, we hear a number of dry rales; indeed, they can often be heard at a distance, indicating that the swelling of the mucous membrane is straitening the air passages. The chest is perfectly resonant when percussed. In a little time, upon applying the stethoscope, we hear the moist rales, caused by the air passing in bubbles through the secretion which the inflamed membrane now begins to pour out. This expectoration is at first watery (*i.e.* serous) and scanty, but afterwards becomes more copious, thicker, and mucous. In favourable cases, the inflammation, after this change in the character of the expectoration, gradually subsides.

From what we know of the reflex function of the spinal cord, we should naturally expect that, during inflammation of the membrane of the bronchi, the muscular fibres of the bronchi should sometimes be thrown into spasmodic action; and in almost every case of bronchitis something of this can be observed, and the coughing and difficulty of breathing are observed to come on more or less in paroxysms. But in some cases these spasmodic actions are exceedingly strong, and give rise to most violent fits of coughing and dyspnoea. These paroxysms often occur upon awakening from sound sleep, and are brought on by muscular exertion or disordered stomach, and very frequently by certain states of the atmosphere, but which vary in different constitutions—a dry state exciting them in one individual, and a moist in another; and, what is very curious, they are more frequently excited by pure air than by air loaded with smoke, and the other emanations of a city.

Instead of subsiding altogether, bronchitis sometimes, and particularly in aged people, passes into a chronic state—the fever disappears, the pain is no longer felt, but the cough, the difficulty of breathing, and the expectoration remain.

Occasionally the inflammation extends over a great extent of membrane, reaches the smaller bronchi, and is, especially when neglected in the beginning, a dangerous affection. In such cases, the arterialization of the blood is interfered with, and, in consequence, many frightful symptoms make their appearance. The difficulty of breathing increases, the face becomes livid, the

circulation begins to fail, and the pulse is soft and irregular; the extremities become cold, and the expectoration cannot be brought up; there is delirium or stupor, and at last death, by the way of asphyxia, ends the sufferings of the patient.

Bronchitis may induce death in another manner, (by coma,) from the flow of blood from the head being obstructed by violent fits of coughing. Apoplexy is induced in this manner, particularly in aged people. Hence, in a practical point of view, it is highly important to check these paroxysms of coughing.

It more frequently, however, when it does not get well, passes into the chronic form than terminates fatally. It even then has bad consequences. In the first place, chronic bronchitis is of itself sometimes fatal. The expectoration, particularly in young people, becomes purulent, hectic fever comes on; the case, indeed, presents every symptom of tubercular consumption, and, after long emaciation, death takes place in a manner like that of death by fasting. Then the paroxysm of coughing sometimes ruptures a number of air cells, which are thus run into one, and the lungs are unfit for the sufficiently rapid action of the blood upon the air, and hence there is habitual shortness of breath. To this state, the name of emphysema is applied. Chronic bronchitis, too, favours the deposition of tubercles, and many a case of it passes into phthisis.

We can easily understand that, in cases of long-continued bronchitis, where there has been much dyspnoea, and particularly where the lungs have become emphysematous, the circulation of the blood through the lungs will be languid and laboured, and from this there results, that the right side of the heart becomes enlarged or hypertrophied. From a similar cause, the liver becomes congested and enlarged. Moreover, from both these two results impeding the venous circulation, the system is strongly predisposed to effusions of serum from the blood, or dropsies. Thus people labouring under chronic bronchitis are very liable to dropsy.

The two contagious diseases, whooping-cough and influenza, are modified bronchitis. Whooping-cough is distinguished by a cough over which the patient has no control, and which consists of violent efforts at expiration, followed by a long inspiration, which, being drawn through a glottis not fully opened, is accompanied by the whoop or crow which gives name to the disease. The cough ends in the expectoration of mucus, and so violent are the muscular motions, that the contents of the stomach are often forced up along with the expectoration. Both the fits of coughing, and the vomiting towards the close of the disease, become habitual, and are relieved by those remedies which act upon the nervous system.

Influenza has been known for many centuries. Its contagious properties are undeniable, but it sometimes spreads so rapidly, that the only way to account for its extent is to suppose "a peculiar condition of the atmosphere"

which excites it. It travels from place to place, and, singularly enough, it proceeds from the east to the west, and from the south to the north. If it commences, for example, in Italy, it goes to Spain, from Spain to France, from France here. It usually rages in a place for six weeks, but after it has left the ordinary inhabitants of a place, strangers seem sometimes to be liable to it. Thus, after it has had its six weeks out in Liverpool, it entirely leaves the inhabitants, but attacks, for two months longer, sailors who arrive in that port from America and other parts. Dr. Watson relates some curious instances of the rapidity with which it has attacked large bodies of men. "On the 3d of April, 1833," he says, "the very day on which I saw the first two cases that I did see of the influenza, all London being smitten with it on that and the following day,—on that same day the '*Stag*' was coming up the Channel, and arrived at two o'clock off Berry Head, on the Devonshire coast, all on board being at that time well. In half an hour afterwards, the breeze being easterly, and blowing off the land, forty men were down with the influenza; by six o'clock the number was increased to sixty; and by two o'clock the next day, to a hundred and sixty. On the selfsame evening, a regiment on duty at Portsmouth was in a perfectly healthy state, but by the next morning, so many of the soldiers of that regiment were affected by the influenza, that the garrison duty could not be performed." Independently of these peculiarities of origin and progress, the bronchitis of influenza is distinguished by the debility which attends it, forbidding bloodletting and great depletion, and often demanding stimulants. Of the ill effects of bleeding in this disease, there is abundant evidence. In a small town in Spain, where two thousand influenza patients were bled, just two thousand died. At least, so it is said. And in an epidemic in England in the last century, it was observed, that the only three who died had been bled.

Occasionally, while we are listening to the rales which are being made in a bronchitic piece of lung, they will all at once cease, and in their place is perfect silence. This is owing to a tough bit of mucus closing entirely up the air passage leading to it. Generally after a cough the mucus is expelled, and the noises recommence. During our hospital days, when we were stethoscoping patients from morning to night, we have often remarked this. It sometimes has happened that the mucus has not been expelled, and that the patient has died from being suddenly asphyxiated. Ardral relates two cases of this kind. Such cases can, without much difficulty, be detected, and the violent action of an emetic would probably remove the plug of mucus.

Of the comparative mortality from bronchitis, some idea may be formed by copying the registrar's report of the deaths from this cause in the metropolis in 1852. They are three thousand seven hundred and forty-four. This shows that bronchitis is a very frequent cause of death.

The treatment of bronchitis requires a good deal of skill and caution. In tolerably young and healthy individuals, and at the commencement of the attack, we often see great benefit follow bloodletting. But if delayed for a day or two, the power of this remedy over the disease is weakened, if not lost; and still later, it would be injurious, as tending even more to enfeeble the circulation at the lungs, and still more to reduce the power of bringing up the expectoration. Local bleedings may, however, be used after the time for general ones has passed. Blisters are generally found very serviceable. A laxative, as part of the antiphlogistic regimen, is proper enough; but violent purgatives have, doubtless, a tendency to diminish the expectoration. In the bronchitis of children, and in hooping-cough, emetics are of great advantage; but some care is necessary in their exhibition, lest we aggravate any head symptoms that may have been produced. Their good effect seems to depend upon the quantity of mucus, the flow of which they excite, facilitating expectoration. A similar effect is perhaps produced by the nauseating expectorants, which, in the early stage of the disease, should always be given. Later on we employ the stimulating expectorants; and in chronic bronchitis, the exhibition of ammonia, combined with expectorants, is often very useful. Notwithstanding that opium may be supposed to be injurious by checking the expectoration, still its careful use alleviates bad and distressing symptoms, and in this manner conduces to a favourable termination. When the spasms of difficulty of breathing are severe, we combine æther with some of the preparations of this drug. And in chronic cases attended with dyspnoea, we also sometimes employ the gum resins, and make the patient smoke stramonium or tobacco in a pipe. Occasionally, when the disease has existed for some time, and there is much secretion into the bronchi, we find it necessary to administer tonics and astringents. In almost all cases of chronic bronchitis, counter-irritation, by means of croton oil, &c., which bring out crops of pustules, is of great service. Lastly, in the cases where the disease being far advanced, the pulse fails, and other indications of sinking come on, and the expectoration is difficult, our only hope is in the exhibition, and often the very free exhibition, of wine, spirits, and other stimulants. It has been observed, that in these last-mentioned cases, recovery seldom or never takes place if delirium have come on.

CHAPER XIV.

INFLAMMATION OF THE LUNGS, OR PNEUMONIA.

To the inflammation of the substance of the lungs, the name of Pneumonia is applied. Although much less frequently met with than bronchitis, still, from its greater danger, it occasions nearly as many deaths as that affection. In London, in 1852, no less than three thousand two hundred and seventy-one deaths are referred to pneumonia. It is most frequent in infancy before the age of five, and in adults after the age of forty, but it occurs at all ages. It sometimes attacks both lungs at once, but even then one is more implicated than the other; and when it seizes only upon one, in two cases out of three it is the right one. The inflammation, in the great majority of cases, commences at the lower parts. As we have before mentioned, before the discovery of auscultation, it was in many cases impossible to be sure that the disease an individual was attacked with was pneumonia, or some other inflammation; and this was rendered more difficult by the fact, that pneumonia sometimes occurs without much fever, and without any peculiar set of symptoms. Now, however, unless the disease be confined to a small and very central part of the lung, we experience little difficulty in satisfying ourselves of its presence.

Pneumonia has three very distinct stages, the anatomical characters and physical signs of which are very well marked. The first is that of sanguineous engorgement and exudation of bloody serum. Supposing the person die at this period, upon examining the portion of lung in this state, we find that it crepitates less under pressure than in the natural state, is heavier, less elastic, and indeed presents the appearance which we would naturally suppose in a lung where serum had taken the place of air would do. It is more easily torn than it usually is, and, from a resemblance to the spleen, this state has somewhat unnecessarily been called splenization. Upon applying the stethoscope to a patient affected with pneumonia in this stage, a very important sound, and peculiar to pneumonia, is heard. This is crepitation, or crepitant rale. We before likened it to the crackling of salt upon a fire, and it has likewise been compared to the noise made by rubbing a small lock of one's hair close to the ear between the finger and thumb. Then there is cough, and the expectoration is often of a peculiar character, having a red colour, very like that of iron rust. There is difficulty of breathing, which remarkably varies in different cases; and usually there is complaint of pain, not of a very acute nature; and the accompanying fever is sometimes inflammatory, and sometimes

approaching more to a typhoid type. These general symptoms, we must observe, are not peculiar to this stage, but belong to the whole disease.

After the effusion of serum comes that of lymph, and this constitutes the second stage of pneumonia. As in this condition the substance of the lung somewhat resembles that of the liver, the term hepatization is applied to it. The affected part of the lung is rendered much heavier—so much so, that it usually sinks in water; but it is more fragile, breaking down under the pressure of the finger. On cutting into it, a number of minute little red points are seen, which are probably vesicles studded with lymph. The conversion of the congested into the hepatized lung is gradual, but its rapidity varies in different cases, probably being more rapid in individuals of a broken or feeble constitution. Very important physical signs attend this state. The lymph obstructs the minute air tubes, and the crepitant rale, and, indeed, respiratory murmurs of any kind, are no longer heard. The consolidated lung, however, transmits the sound of the air in the larger tubes, and also that of the voice. If the hepatization include some large tubes, the blowing, whiffling, bronchial respiration is very distinct, and bronchophony is heard when the patient speaks. Should the left lung be affected, the sounds of the heart are transmitted to an unusually wide extent. From the same consolidation we have dulness upon percussion, and the expansion of the affected side can be noticed to be less than that of the other side.

This stage may pass off, and the lymph become converted into pus. This is the third, or suppurative stage. Sometimes, but very rarely, it has been collected together so as to form an abscess; but, in the immense majority of cases, it is equally diffused over the diseased part. We have now, upon auscultation, a *mucous* rale. Of course, the state of a patient in this third stage is critical enough, but recoveries from it undoubtedly take place. During it, the fever often assumes the hectic form; and if this hectic do not abate in the course of three weeks, we may conclude that ulceration is going on, and this ulceration is very frequently attended with tubercular deposition.

In some cases, which are not fatal in the hepatized stage, the condensed lung does not pass into a state of suppuration, but the inflamed lid shrinks up, becomes impervious to air, and acquires a dark colour. Tubercles are often afterwards deposited in this portion, and a person thus affected requires to take the greatest possible care of any of the exciting causes of their deposition. He is always short-breathed, and is also rendered liable to many other diseases of the lungs, and to dropsy.

Sometimes, but rarely, inflammation of the substance of the lung ends in gangrene. The fetid odour of the breath sufficiently distinguishes this.

Pneumonia is generally combined with some degree of bronchitis, and also of pleurisy, a disease which we will describe in our next chapter.

Pneumonia seems to possess a tendency to get better on the critical days, as they are termed, particularly on the seventh, eleventh, fourteenth, and twentieth day after the disease begins. When a fatal termination comes on, death, as may be expected, takes place by way of asphyxia.

A disposition to pneumonic inflammation is much greater in some families and individuals than in others, and a person who has had one attack is much more liable to another than one who has never had pneumonia. One very powerful predisposing cause to it is, disease of the left side of the heart; and, unfortunately, when it occurs under such circumstances, it is less under the influence of treatment than in ordinary cases. The debilitating causes we before mentioned, as predisposing to inflammation in general, are remarkably seen to predispose to pneumonia. Its most common exciting cause is cold. In London, in 1852, in the quarter ending December 31, one thousand and thirty-six deaths took place from this cause; in the one ending April 2, nine hundred and eight; while in the two warm quarters, in the one ending July 2, there were seven hundred and eighty-three, and in the one ending October 1, but five hundred and forty-four.

Pneumonia is often combined with continued fever and the exanthematous fevers; but there are two peculiar forms which demand a word or two. Sometimes, after suppuration in other parts of the body—as in inflamed veins, in the suppuration in the skin after smallpox, and particularly after the amputation of a suppurating surface—pneumonia comes on, attended with much debility. There is little doubt that, in such cases, purulent matter is circulating or retained in the blood. The other is, when, from some other enfeebling disease which is likewise present, the inflammation has a strong tendency to go on to rapid gangrene. We may observe, that the only treatment in such cases consists in administering stimulants.

The treatment of ordinary uncomplicated pneumonia is well understood. In no disease are the good effects of early and copious bloodletting better witnessed. The first bleeding should be continued until the breathing be relieved, or some general impression made upon the system. It will almost always require to be repeated—often five or six times. A vein may be opened, if necessary, three times in the twenty-four hours. As an auxiliary, we employ local blood depletion, cupping, or leeching. Even in enfeebled constitutions, and when typhoid symptoms are present, if seen at the commencement, a moderate bleeding may generally be ventured upon; but if the disease have continued for some time, or the general depression be very great, we must confine ourselves to local abstractions of blood. It is an important practical fact, that, in judging of the necessity for the repetition of bleeding, we must not be guided by the auscultatory sounds or the expectoration, but by the general symptoms.

We possess a most powerful auxiliary to bloodletting in tartar emetic. This medicine—given every hour in nauseating doses—has a remarkable efficacy in lowering the circulation, relieving the dyspnoea, facilitating expectoration, and in diminishing the necessity for venesection. During the height of the disease, a much greater quantity of this medicine can be taken, without producing nausea, than under other circumstances, and on the continent it is customary to administer such large doses. The experience of this country prefers, however, moderate doses.

The calomel and opium pill—given so as to affect the gums—is much trusted to by many physicians, especially in the second stage, when the lymph is effusing. It may, however, be doubted if the calomel have any specific effect, either in preventing or in removing the hepatisation. The opium seems to be of the greatest use, when, after copious bleeding, there is some of that reaction after loss of blood which we formerly alluded to.

Blistering during the acute form is of no use, but, on the contrary, adds to the fever; but towards the close of the disease, it may be advantageously employed.

In many cases, towards the close, when the more acute symptoms have passed off, and in neglected cases, when we have a rapid and feeble pulse, and continuance of cough and dyspnoea, with dark-stained but scanty expectoration, we often see great benefit from the use of stimulants, particularly wine and ammonia.

During convalescence, we have to watch the patient carefully, not only for fear of a relapse, but lest symptoms of tubercular deposition manifest themselves.

CHAPTER XV.

INFLAMMATION OF THE PLEURA, OR PLEURISY.

PLEURISY is not now-a-days, at least in large towns, a disease of very frequent occurrence. In the metropolis, in the year 1852, only one hundred and fifty-four deaths have it assigned as their cause. We shall, therefore, very briefly consider it, and by this means we shall be enabled to devote a larger space to the important subject of consumption, or phthisis.

The symptoms are plain enough. There is fever—almost always of an inflammatory description; violent pain in the side—increased by inspiration, but not by pressure; a hard pulse, some difficulty of breathing, and, after a day or

two, there is dulness on the affected side; the respiratory murmur cannot be heard, but is often puerile in other unaffected parts; the peculiar modification of bronchophony, called *ægophony*, is heard, and the expansion of the chest is obviously upon the inflamed side. These symptoms depend upon effusion of serum into the cavity of the pleura, along with patches of false membrane and flakes of lymph, which, after a time, often pass into pus.

Sometimes this effusion is unusually great; occasionally so much so, as to displace the heart, and even to push it to the right side of the chest. In these cases, also, the whole side is much distended, and the intercostal spaces filled up. This great amount of effusion, however, more frequently attends a more chronic form of pleurisy, in which both the fever and the dyspnoea are slight, and the pain but little complained of. When the fluid is changing into pus, there is often, particularly in young people, hectic fever. We may farther remark, that in pleurisy, at least when the effusion has taken place, the patient generally lies upon the affected side.

The treatment of acute pleurisy in no way differs from that of ordinary inflammation—bleeding, both general and local, nauseants, calomel and opium, and blisters. After the urgent symptoms disappear, the effusion may even increase a little, but we may confidently expect that it will spontaneously be absorbed in no very long space of time. If, however, the early symptoms be neglected, or if the inflammation be of a chronic nature, the effusion may remain unabsorbed for a long time, even for years, and it ultimately terminates fatally, by the gradual exhaustion of strength, and the hectic fever. In such cases there is generally ulceration, and the matter may point and burst either into the lung or upon the skin outside; and in this manner the fluid may be got rid of. This termination has been imitated, and the pleura has been tapped; but as this implies the admission of air into the pleura, and a consequent danger from rapid sinking from suppuration, it is only advisable in such extreme cases as where death is threatened by asphyxia.

When this operation is not performed, we, as long as there is any tendency to active inflammation, keep the patient in bed on low diet, repeatedly applying blisters, and administer successively mercury, diuretics, and iodine; but the effusion of chronic pleurisy is not very amenable to treatment.

Cases of typhoid pleurisy are occasionally seen of a particularly fatal nature, and which depend on the presence of pus in the circulation, in the same manner as we recently remarked some cases of typhoid pneumonia did. Similar cases also occur in conjunction with epidemic rose, or erysipelas.

CHAPTER XVI.

CONSUMPTION OF THE LUNGS, OR PHTHISIS.

No disease commits such dreadful ravages in this country as the tuberculous disease of the lungs, to which the name of phthisis, consumption, or decline, is given. There are few of us who have not had to mourn the loss of a dear friend by this malignant scourge; and there are more, we fear, who have to deplore that of very many. In the metropolis, in 1852, no less than six thousand nine hundred and thirty-five died of decline, or more than one in eight of the whole number of deaths. There is something, too, particularly distressing in everything connected with this disease. Its proneness to attack "the fairest and the best" has often been remarked, and is, in many cases, undoubtedly correct. The insidiousness of its approach, and, in many cases, the slowness of its progress, and the many alternations for better and worse, and the many hopes of recovery that it excites—hopes never to be gratified—all add to its terrible nature. And no disease, perhaps, gives so much pain to the physician. He sees in a family one more delicate, but more kindly and intelligent, than the rest; his experienced eye perceives the marks of tubercular diathesis; some little indisposition is felt, and he is called in; he finds a slight cough without expectoration, a little difficulty of breathing upon exertion, and a quick and soft pulse, and he suspects what is going to come. By-and-by these symptoms increase, and there is some little emaciation, and he fears that his suspicions are to be realized; then comes hectic spitting of blood, and, on listening to the chest, he hears those sounds that tell him that his worst fears were correct; and he sees before him all the events of the few months of life which are granted to his patient, and knows that he can do nothing to cure or save him—nothing but to palliate. A disease, however, like this, demands a somewhat extended consideration.

We need not repeat what we have before said of the tubercular inflammation, of the deposition of tubercle, and its softening. Consumption of the lungs is caused by the deposition of tubercles in these organs, which soften and form ulcers in them; and the fatality of the disease does not depend upon any incurable or malignant nature of these ulcers, but upon the fact, that tubercles once deposited in the lungs are almost universally followed by fresh deposits, which, running the same course, disqualify the lungs for their office, and are attended with hectic fever, and other debilitating causes, which uniformly, in the long run, produce death in the way of asphyxia.

Tubercles are usually deposited, at least in the first instance, in the upper lobes, and more frequently in the left lung than in the right. In fact, they, in both these respects, are the opposite to pneumonia. A number of them coalesce, inflammation of a slow scrofulous kind is set up, and the whole softens, breaks down, and is coughed up, leaving an ulcer, or cavity, technically called a vomica.

These vomicae vary very much in size. Some of them may not contain the small silver coin worth threepence, while others may hold more than a pint of fluid. These very large ones are observed to be confined to the upper portions of the lungs, and are, in fact, composed of several small ones which have run together. Opening into the cavity, one or more bronchial tubes are seen, with their mouths open, just as if they had been cut across with a knife at the point where they enter the vomica. But what may at first seem very extraordinary, it is a very rare thing for the bloodvessels to be so acted upon. Sometimes, indeed, a considerable one is ulcerated into, and copious and fatal bleeding takes place. But this is very rare. The reason of this is, that the bloodvessels are pushed on one side and compressed, while the blood in them coagulates, and they are obliterated at some distance from the point of obstruction.

The portion of lung in the neighbourhood of a vomica is condensed, partly, perhaps, from inflammation, but partly from tubercles being deposited in it.

We believe that we are correct in saying, that a well-marked case of phthisis never recovers; but there is no doubt that a single vomica may form, discharge its matter, and heal; or a small portion of tubercle occurring singly may have its watery parts absorbed, and its earthy ones concreting, form a little shrivelled chalky mass, which may either be coughed up, or remain for years inert in the lungs. But even these are of rare occurrence, and we doubt if, in such, there have been any well-marked constitutional symptoms.

In almost every case of consumption, there is more or less pleurisy, which inflammation, pouring out adhesive lymph, attaches portions of the lungs to the ribs.

Although in consumption we see the most striking changes taking place in the lungs, yet, during the course of the disease, many other parts of the body generally become affected with tubercular deposits, which soften in the same manner as those in the lungs. The mucous membrane of the larynx and trachea are very liable to become ulcerated, and it is owing to this cause that the hoarseness of voice, which we dare say our readers have observed in phthisical patients, depends. It is a curious fact, that only one side of the trachea is found ulcerated in this manner, and this is the side which corresponds with the diseased lung, or with the one which is most so. In five-sixths of cases of consumption, too, tubercles are deposited in the mucous membrane of

the alimentary canal. The glands of the mesentery are also frequently studded with tubercles.

The course of consumption may be conveniently divided into two stages, the first being that of the formation and aggregation of the tubercles, and the second, that of their softening and evacuation.

Premising that the symptoms vary very much both in rapidity and intensity in different cases, the following are those which characterize the first stage:—

A slight and hacking cough, attended with little or no expectoration, is one of the earliest symptoms. At first it is occasional, and generally comes on pretty regularly when the patient rises from bed, and also during the day when he makes any extraordinary exertion. It feels as if it were excited by some very slight irritation about the throat. Often it will disappear for a time, particularly if the weather becomes warmer, and then return when it gets colder. Pain, although of a moderate kind, is felt in the chest, and often at the side corresponding with the affected lung, and therefore more frequently upon the left side. To this pain the name of stitch is given, and it often depends upon slight inflammation of the pleura. A disagreeable sensation of weakness in the chest, too, is often complained of. The pulse is generally considerably quicker than natural, and a very trifling excitement is sufficient to raise it still more. A slight degree of hectic fever insidiously creeps upon the sufferer. He feels a little chilly towards evening; and when in bed, he is annoyed, and perhaps kept awake, by heat in the palms of his hands and the soles of his feet, and a sensation of flushing in the face. Towards morning he perspires, and it is curious that he does so when sleeping, hardly ever when awake. There is seldom much dyspnoea—at least while the patient is not exerting himself. Indeed, it is remarkable to observe, when the disease is in a much more advanced state than this, how little difficulty of breathing is experienced, even perhaps when three-fourths of the lungs are decayed. Consumptive patients will rarely believe their state, and often adduce this easiness of breathing as a proof of the soundness of the lungs. Along with all these symptoms, there is more or less of wasting of the whole body, and especially of the fat.

If we minutely examine the chest of a patient in this stage of consumption, we can often observe that one side of the chest does not expand quite so much as the other. Upon trying percussion, we have more or less of dullness, owing to the condensed state of the lung under one clavicle, and of course more frequently under the left one; and if the indurations be of any extent, we hear, upon applying the stethoscope over the same part, bronchial respiration and bronchophony. Our readers will of course remember, that by this we mean that the diseased portion of lung, from being denser, transmits the sound of respiration, and of the voice, better than when in a healthy state.

When the disease arrives at its second stage, and when the matter softens, and by the aid of ulceration discharges itself, we have still more striking consumptive symptoms. The cough is now accompanied by a profuse expectoration of mucus, pus, and tubercular matter, and sometimes also of little bits of lung in a fetid state. Moreover, in very many instances, there is spitting of blood, often to a pretty considerable amount. Spitting of blood depends upon many other causes besides phthisis; but out of five cases in which it occurs, it is symptomatic of this disease in about four. As we have before said, it does not depend upon the rupture of a vessel from ulceration, but is, on the contrary, a morbid secretion poured out by the mucous membrane. The hectic fever now becomes confirmed. The centre of the cheek always wears a confirmed hectic flush. The amount of fever at night is very considerable, and the morning perspirations most profuse—sometimes soaking all the bedclothes. The patient is generally tormented, and very much weakened, by attacks of diarrhœa, caused by the tubercular disease of the bowels. The emaciation becomes greater and greater, as may be seen in the wasting of the flesh of the body and extremities, the thin countenance, the sharpened nostrils, habitually moving at each breath, and the eye, which, from having its fat entirely absorbed, has a peculiar brightness and clearness, seen in no other disease. The mind, so far from being affected, is, if anything, more brilliant, and never desponding, but full of hope. Partial dropsies, or effusions into the cellular texture at the ankles and wrists, are now often seen. The lungs go on decaying, the body wasting, the strength failing, “yet it is all by even degrees, a *facilis descensus*; the thread of life dwindles away fibre by fibre, without struggle or shock, and gentle is the parting of the last filament, when the body drops to earth, and the soul rises to eternity.”

In many cases, however, the disease goes on by no means so tranquilly. Intercurrent inflammations of the bronchi, lungs, and pleura, frequently come on, and the sufferings from these, from the difficulty of breathing, from the cough, from the chills and heats, from the pain, and from the oppressive feeling of weakness and sinking, are often very annoying. Usually, before death takes place, three-fourths of the lungs are wasted away.

One curious symptom is generally seen in the advanced stages; the nails are all curved inwards, and the ends of the fingers are clubbed.

In some instances the ulceration of the lungs leads to perforation, and escape of air and pus into the pleura, and, but much more rarely, the coats of the bowels are perforated, and their contents, escaping into the peritoneum, excite fatal inflammation.

If we use percussion over the affected lung in this stage, from the induration round the vomica we still have dullness, and upon listening with the stethoscope, we hear some very decided sounds. While the softening is going

on, and mucus and pus are lying in the cavity, we hear the air passing through them with a clicking, bubbling sound, which we before alluded to under the name of cavernous rale. When the cavity is nearly or entirely empty, this passes into cavernous respiration and pectoriloquy. The sound of cavernous respiration depends upon the size of the cavity, and varies from a click to a noise like that of blowing into an empty decanter. It may, when the cavity is small, be imitated by blowing into thimbles or little shells. Pectoriloquy, or the sound of the voice as if it issued from the vomica, is always heard, and it is accompanied by whiffs from the cavernous respiration, which give it a snuffling character, and it is circumscribed. It differs in these two latter respects from bronchophony, but it requires a very accurate ear in every case to discriminate them.

Consumption of the lungs varies in its duration. It has been known to terminate fatally on the seventeenth day; and Dr. Gregory, who saw the case, knew an old man, who was seventy-two when he died, in whom symptoms of phthisis showed themselves at the age of eighteen. From the difficulty of distinguishing phthisis from other chest affections, before the discovery of auscultation, we may doubt that the old man really was consumptive. On the average, consumption perhaps runs its fatal course in about nine months. It is a common opinion that consumption only happens in young people, and that any one past the age of thirty or forty is secure from it. This is a great mistake. In London, the greatest number of deaths from this disease happen between the age of twenty and thirty, then between thirty and forty, then between fifteen and twenty, then between forty and fifty, then between fifty and sixty. In the sanatory reports, we observe deaths referred to phthisis after the age of eighty.

Many varieties of consumption, principally connected with the rapidity with which they incline to a fatal termination, have been described, and undoubtedly exist; but in a short popular sketch like this it is impossible to detail them.

The great predisposing cause to consumption is the scrofulous diathesis; but there seems to be little doubt that physical irritation of the lungs can bring it on in all constitutions. We have striking instances of this in the grinders at Sheffield, in whom the particles of steel inhaled with the breath excite tubercular disease. The men who grind the forks use exclusively a dry stone, and they are said uniformly to die of phthisis before they have attained the age of thirty-two; and the razor-grinders, who use sometimes a dry stone and sometimes a wet one, live on a little longer, while the knife-grinders, who work entirely with a wet stone, live on to between forty and fifty. The moisture, of course, diminishes the quantity of particles of steel flying about in the air of the workroom. These statements are made upon such good authority, that it is impossible to discredit them. Were they not, we should be inclined to

believe that, at any rate, it was not correct to say that *all* of these workmen died before these ages, but only a part; or, in other words, that those who had the scrofulous diathesis, and who were exposed to such exciting causes, became consumptive. Somewhat similar statements have been made relative to other trades. Thus, the men employed to quarry gunflints at St. Roque, usually die of consumption before the age of forty. Stonemasons, particularly those employed upon very hard stones, as granite, and colliers, have been remarked to be particularly liable to consumption; and, in the case of these latter, there is very direct evidence of the inhalation of the powder of coals, for the lungs are stained black. Inhalation of animal and vegetable dust also appears sometimes to be productive of phthisis. This has been noticed to be particularly the case with feather-dressers, brush-makers, and flock-carders. Further, in experiments upon animals, something resembling tubercular deposits are produced by physical irritation of the lungs.

But, in the great majority of cases of consumption, we can trace no physical irritation as occurring before the invasion of the disease, and we can usually discover either traits of the scrofulous diathesis, or an hereditary tendency to some form of scrofulous disease. This tendency to consumption is often notably increased by any of the debilitating causes, which we have before had occasion to notice, as powerfully predisposing to disease. Thus, we often see consumption come on in those who have had deficient or improper food, or insufficient clothing; who have suffered from misfortunes and disappointments; who have lived too sedentary a life; or who have been exposed to other depressing causes. We can very often trace the exciting cause to an attack of pneumonia, or bronchitis, or to an exposure to cold. But in those strongly predisposed to phthisis, we frequently see it come on without any apparent exciting cause.

The objects of the physician, in a case of consumption, are to endeavour, in a patient with the scrofulous diathesis, to prevent its appearance; to strive, when it is coming on, to arrest its progress, or at any rate to render it as mild and latent as possible; and when it is fairly developed, to try, not only to prolong life as long as may be, but to render it as little uncomfortable as can be managed.

For the first of these purposes we employ the tonic regimen—nutritious food, pure air, moderate exercise, warm clothing, cleanliness, abstinence from excessive toil, and the like. The surest plan would be removal to a warmer climate, for we ought to have observed, that consumption is a disease of temperate climates, and has little comparative effect upon the mortality of warm ones. Practically speaking, however, such an advice would seldom be listened to.

It is when the disease has fairly commenced its attack that the patient will submit to change of air. The places usually selected are—Madeira, Rome, and Nice. Dr. Williams supposes that the north of Africa offers many advantages

as a residence for consumptive patients, could suitable accommodation be found for them. If it is not possible or convenient to go so far, we substitute places upon our own coast. The best of these are—Torquay, Undercliff in the Isle of Wight, Hastings, and Penzance. When the disease has made some progress, and the lungs are in a state of rapid disorganization, it is worse than useless to drag a patient from the comforts of home merely to die among strangers.

Should any of the "intercurrent inflammations" occur, we make use, but very cautiously, of antiphlogistic remedies, and we almost always see the disease somewhat delayed and relieved by the constant counter-irritation produced by the daily use of the croton oil ointment.

Gentle exercise, when the weather is mild and dry, and the strength will permit, should always be employed as part of the tonic plan of treatment, and it has been supposed that riding upon horseback is the best form of taking exercise which a consumptive person can choose. It certainly gives him fresh air and exercise without hurrying the breathing.

With regard to the diet, the object is to keep up the strength of the system as much as possible, inasmuch as the case will certainly terminate in syncope, and therefore the more strengthening and nutritious it is the better. Unfortunately, however, it very often happens that the febrile state of the system rebels against animal food and wine. We must then be guided by circumstances, and do the best we can. During the latter stages, wine is borne well, and gives marked relief to the distressing feelings of sinking and extreme debility.

Temporary benefit often follows the use of the two tonic medicines—iodine and iron. To relieve the cough, we give the expectorant remedies mentioned under BRONCHITIS.

When the lung has fairly got into a state of disorganization, we do the best we can to smooth the pillow of the dying man. When attacks of spitting of blood come on, we use astringents, especially the acetate of lead. To relieve the diarrhoea, we employ the same remedy, combined with opium. When the night, or rather the morning perspirations are troublesome, we administer the dilute sulphuric acid, and also sponge the body at bedtime with vinegar and water.

Sometimes, towards the close of the disease, the stomach sympathizes with the general weakness, and becomes very irritable. A couple of drops of prussic acid in an effervescing draught will sometimes be of service. Occasionally, too, a still more distressing event happens before dissolution—the bones of the unfortunate patient are laid bare, from the pressure upon parts where the circulation is very feeble. We cover them with soap-plaster, and take off the pressure by means of cushions, or put the patient into one of Dr. Arnott's water-beds.

CHAPTER XVII.

INFLAMMATION OF THE HEART AND BLOODVESSELS.

IN the metropolis, in 1852, only one hundred and sixteen individuals are stated to have died from acute inflammation of the heart. There is no doubt, however, that a much greater number die from the effects of such inflammation. Nevertheless, we purpose to make our observations upon it very brief.

The membrane lining the heart, the substance of the heart, and the heart's purse, or pericardium, may each be inflamed. The names of endocarditis, carditis, and pericarditis, have been respectively given to these inflammations. It is not possible in their early stages to distinguish them, and we will therefore make some general remarks upon them in common.

These inflammations sometimes begin suddenly, and are attended with very active inflammatory fever; but more frequently they commence and go on in a very chronic and insidious manner. Sometimes, too, they are alone, but oftener they are combined with other inflammations of the chest, or with rheumatism. When they occur, there is increased pulsation of the heart, which causes sudden starting when the patient is going to sleep, and the pulse is often irregular. There is pain over the heart, increased by pressing underneath the breastbone, and to the left of it there is dullness upon percussion. These two symptoms indicate the inflammation of the pericardium. Then there is difficulty of breathing, with a short and hurried respiration, increased on the slightest exertion, and in the latter stages only relieved by leaning forwards, and often there is cough. The sounds of the heart, too, are very much altered. When the pericardium has been some little time inflamed, we hear a rubbing sound, which denotes effusion into the sac. A loud bellows sound denotes the effusion upon the valves. Then, if the aortic valves are affected, the pulse at the wrist is morbidly strong, but regular, and, from the aorta usually partaking of the disease, the pulsation in the subclavian arteries is increased, and often attended with a bruit. If the mitral valve be diseased, the pulse at the wrist is irregular, and does not correspond always with the pulsations felt at the chest; *i. e.*, the blood in some contractions of the heart, instead of being driven into the aorta, regurgitates. Lastly, when the disease has lasted some little time, there is enlargement of the heart. From the circulation being more difficult, its contractions are rendered more forcible; and just as the blacksmith's arm becomes larger from its great labour, so does the heart, from its additional work, become,

to use the technical term, hypertrophied. We can easily ascertain its enlargement, by observing that its point beats below the sixth rib.

Of the other diseases with which these are liable, soon after their commencement, to become complicated, the most important are, pneumonia, bronchitis, and enlargement of the liver, and these complications are very liable to be followed by dropsy.

The alterations of the structure of the valves, &c., produced by these inflammations, strongly predispose to many diseases. Of these, we may instance asthma, pneumonia, apoplexy, epilepsy, disease of the liver, and all forms of dropsy. But it is to be remembered that they are only the predisposing causes, although undoubtedly very powerful ones, and that exciting causes of these diseases exist which may often be avoided.

In the acute form of these diseases, the danger is often very imminent, and death takes place by syncope—often in a very sudden and unexpected manner. The reason of this seems to be, that, under the stimulus of inflammation, the strength of the contractions of the heart is fallacious, and only apparent. In the more chronic cases, death, too, generally (*i. e.*, if the patient die of the primary disease) takes place from syncope, in the same similar and unexpected manner.

Inflammations of the heart are caused by the ordinary causes of inflammation, and also in a particular manner by rheumatism.

The treatment in the acute forms must of course be antiphlogistic; but large and repeated bleedings are dangerous, owing to the apparent strength of the heart, when it is in reality very weak, and such may irretrievably depress its powers. Local or small bleedings are therefore to be preferred. All the other antiphlogistic remedies are employed as in other inflammations, and many practitioners have thought that the calomel and opium pill was particularly useful in pericarditis. Sometimes, as may easily be supposed, there may be depression of the vital powers and typhoid fever, clearly demanding stimulants.

The main object of treatment in the chronic forms, is to preserve the patient from the exciting causes of the diseases to which inflammations of the heart so powerfully predispose, and, when any of them do appear, to attempt to stop their progress as soon as possible; and experience teaches us that nothing is so effectual for the purpose as small but general bloodletting.

The same diseased states, proceeding from the same causes, and predisposing to the same diseases, occur in the large arteries near the heart.

Two distinct forms of inflammation of veins are seen. The one is common inflammation, producing swelling, hardness, and tenderness of the affected vessel, and attended by all the inflammatory effusions, and yielding to antiphlogistic treatment. In the other inflammation, which is of a specific nature, there is typhoid fever, often much vomiting, and diarrhoea, and sinking, and

there is rapid purulent deposit into the different organs or joints of the body, evidently indicating the circulation of pus. The chances of recovery in such are very small, and our only hope is to be placed in stimulants.

CHAPTER XVIII.

INFLAMMATION OF THE LIVER.

THE liver is occasionally liable to attacks of acute inflammation, and still more frequently to those of chronic. To this inflammation the name of hepatitis is technically applied. It is a disease which occurs much more frequently in hot than in temperate climates. In both forms it may end in secretion of pus; but in the chronic state, enlargements and indurations are a common and important termination.

Of the well-marked cases of acute hepatitis, the symptoms are fever, pain, and a sense of tension upon the right side; inability to lie upon the left side, *i. e.*, that side which would put the connections of the inflamed organ upon the stretch; difficulty of breathing; cough, from the sympathy of the lungs, and hiccup from that of the stomach. To these we must add the sympathetic pain in the right shoulder, which we have before had occasion to allude to. Sometimes, too, there is jaundice.

It is a curious fact, that inflammation of the liver, going on to suppuration, is occasionally produced by severe bodily injuries of other parts, as, for instance, of the head.

If, in a case of acute hepatitis, the pain suddenly cease, and the patient is attacked with rigors,* we may generally conclude that an abscess full of pus has formed in the liver. The question now is, what is to become of it? It may escape into the pleura or peritoneum, in either of which cases it will almost certainly set up fatal inflammation; but it may also burst into its own duct, or upon the skin, in which two cases it is comparatively harmless. When it is considered that the liver is not attached to the internal surface of the abdominal parietes, it may seem strange that this latter termination can happen. And, indeed, it depends upon a very curious provision, and one which we alluded to when we were treating of the beneficial effects of inflammation. Its proximity to the surface of the liver excites a degree of inflammation, which causes lymph to be effused, and adhesions are formed between the liver and the walls of the

* Rigors are the technical expression for cold shiverings alternating with hot flushes.

abdomen. In this manner the pus is discharged upon the skin, instead of being effused into the peritoneum.

The treatment of acute hepatitis in no respect differs from that of other acute inflammations, excepting, perhaps, that mercury is not so well borne in it as in them.

Cullen's definition of chronic hepatitis is, "some fulness and some weight in the region of the liver; some shooting pains felt at times in that region; some uneasiness or pain felt at pressure in that part; some discomfort from lying upon the left side; perhaps some degree of jaundice, and sometimes a certain amount of fever, combining itself with more or fewer of these symptoms."

The acute hepatitis is sometimes found in scrofulous young people, and is a part of the general morbid condition of the system. In older persons a remarkable disposition to it is produced by repeated fits of ague, by such diseases of the heart and lungs as impede the circulation through the chest, and by the excessive use of spirituous liquors. All these evidently act in the same manner, by producing congestion of the liver.

Chronic inflammation of the liver may end in suppuration, like the acute, but more frequently, as we have just stated, in induration and enlargement. Often this enlargement is followed by morbid shrinking, owing to the glandular structure being absorbed. In this case, the bile, not being secreted, is retained in the system, and acts as a poison, producing death in the way of coma.

It is remarkable that many cases of inflamed liver, particularly of the chronic form, are attended with extreme apprehension and lowness of spirits.

Besides the treatment common to chronic inflammation, two remedies have been thought to be particularly beneficial in this disease, especially when there is evident enlargement. These are iodine and dandelion. In Germany, the muriate of ammonia, a medicine which we are in the habit of regarding as of little efficacy, is much employed in this as well as in many other diseases. Practitioners of every country seem to have a drug in whose efficacy they place unbounded confidence. With the Germans, it is this preparation of ammonia; with us, perhaps, it is mercury. If so, it must be confessed that if we have the more efficacious of the two, we have, at the same time, the one the most mischievous if unnecessarily employed.

CHAPTER XIX.

ON INFLAMMATION OF THE PERITONEUM, OR PERITONITIS.

INFLAMMATION of the peritoneum is a disease which much more frequently occurs in the female than in the male sex. Although commencing in a confined spot, it rapidly extends over the greater part of the membrane. We recognize it when we find febrile symptoms, and pain and tenderness of the bowels, increased by the slightest pressure, and which also causes the breathing to be entirely thoracic. There is often also hiccup and vomiting. The pulse, from the peculiar depressing effect, which we have frequently had occasion to notice, of injuries of the intestines upon the circulation, generally becomes small, or even very weak; but the patient remains quite free from all typhoid symptoms.

Symptoms very similar to these sometimes come on in nervous females, which are not of an inflammatory, but of a neuralgic nature, and which occasionally require all the tact of the physician to discriminate.

The various cases of this disease differ very much in acuteness, and in the length of time which intervenes before recovery or death takes place. The most rapid and the most fatal are those which are excited by a perforating ulcer, which introduces foreign matter, as it is termed, into the peritoneum. When this happens, death may take place in a very short time, while other examples of the disorder may recover after several weeks' inflammation.

Death in this disease always begins at the heart. In the more prolonged cases, it may take place somewhat in the same manner as in death by fasting; but in the more rapid, as by sudden syncope. And in the treatment we should always keep this probable termination in view.

The causes of peritonitis are those of inflammation in general. It is said to have occurred as a metastasis from rheumatism.

The number of deaths referred to this disease in the metropolis, in 1842, is only sixty-four.

The treatment of peritonitis consists of bloodletting, both general and local; and in the less acute cases, on account of the depression of the action of the heart, the latter is to be preferred—the free administration of opium, and the remainder of the usual treatment of inflammation.

The mucous membrane of the bowels is liable to ulceration. When that of the large intestines is in this state, after the effusion of serum, there is a great

effusion of lymph and blood. The various viscera of the abdomen are also liable to inflammation; but the only one which we have space for the consideration of, is inflammation of the kidney.

CHAPTER XX.

INFLAMMATION OF THE KIDNEY.

ACUTE inflammation of the kidney is a disease rarely seen, and when it is, it is generally produced by mechanical irritation. The kidneys, however, are liable to a peculiar change of structure, which is accompanied by a change in the nature of their secretion, and followed by very important consequences, and which seems to be, in the first place, of the nature of chronic inflammation. It is called Bright's disease, or granular degeneration of the kidney.

Sometimes these cases are distinctly attended with febrile symptoms, pains of the back, vomiting, and either rapid sinking or stupor, ending in coma, and produced by the retention of urea in the system. Sometimes there is dropsy of the abdomen, and sometimes not. Upon examining the diseased kidney, we find that it is softened, congested, and enlarged. Besides these changes, that part of it called the cortical substance is changed, and it often has a granular appearance—which names the disease. In the more chronic cases, the febrile symptoms may not be appreciable, but the same change in the structure of the gland takes place. Now, when this occurs, the kidney, to use the language of Dr. Watson, is spoiled, and it imperfectly performs its office of separating the nitrogen, or urea, which has become excrementitious, from the system. From this a great many ill consequences follow.

We easily recognize the disease by the changes which take place in the urine. Its urea is diminished in quantity. This we ascertain by finding its specific gravity to be much lower than natural, and a quantity of albumen, from a perversion of the secreting power of the kidney, is found.

In these chronic cases, as the sound parts of the kidney become less and less, and the amount of the separation of the urea gradually diminishes, the nervous system becomes affected, and there is drowsiness, imperfect vision, headache, and at last perfect coma. This fatal termination is, however, often procrastinated for years; but during all this time the quality of the blood is very much deteriorated from the constant drain of albumen from it. This

deterioration of the blood gives a pallid waxy appearance to the countenance, which, to an experienced eye, often at once reveals the nature of the disease.

Dependent upon this alteration in the blood, is a tendency to many other and severe diseases, which very often cut off the patient before the retention of urea has been so great as to poison him. From this cause, in a great measure, patients suffering from Bright's disease of the kidneys are remarkably liable to other diseases of the heart and liver of a chronic nature, and particularly to sudden inflammation, especially of the chest, and they are very much so to attacks of dropsy, particularly after exposure to cold. Independently of liver disease, too, they are often subject to attacks of vomiting and diarrhoea, which seem to be attempts of the system to get rid of the poisonous nitrogen.

This disease, although of frequent occurrence, was first described by Dr. Bright some twenty years ago.

When the degeneration is confined to a small spot, it sometimes does not spread, and in time becomes a solid inert mass. In this manner recovery may take place.

The great predisposing causes to it are, intemperance, scrofula, and the state of the system produced by scarlet fever. The exciting cause has been traced to exposure to cold, to a blow, to drinking a draught of cold water while overheated, &c.

No disease requires more scientific treatment than the one in question, and it is needless here to particularise it. We may state that, in the acute forms, we use the common antiphlogistic remedies; that in a few cases the morbid condition of the urine disappears—sometimes under the use of diaphoretics and the warm bath—sometimes under a tonic regimen, particularly when iodine forms a part of it, and that the tendency to coma may often be protracted by the use of diuretics.

CHAPTER XXI.

RHEUMATISM.

RHEUMATIC inflammation is of two kinds, the acute and the chronic; and between these extremes are a number of graduations. The acute form is most common in seasons of the year when the temperature is variable. Thus, it is more frequent in spring and autumn than in winter, when the cold is considerable and constant. It very seldom is met with in summer. Its exciting cause

is generally cold, applied after the body has been warm, or when one part of the body has been kept cold while the rest was warm. Some strong predisposing cause is necessary, and as lithic acid has been ascertained to exist in rheumatic deposits, it is presumed that this is some peculiarity in the constitution of the blood. The acute kind is principally confined to those between the age of fifteen and thirty-five. Further, it is said that those of a sanguine temperament are more liable to the acute kind than others.

The first symptom is generally severe pain in the ankles and insteps, often accompanied with shivering. In a short time these parts are much swollen. Speedily all the large joints are often affected in a similar manner, but the smaller ones more rarely. It is seldom, however, that all the large joints are attacked at once; but, as we had occasion to mention before, the disease shifts from place to place, and, having abated in one joint, seizes hold of another. Muscular parts are also similarly affected. Along with this there is a good deal of fever present, in which there is, instead of dryness of skin, often much perspiration, which has a peculiarly sour smell. This fever is generally exacerbated in the evening, and the pain is most considerable during the night; and it is during the night that the disease usually shifts from one joint to another. The pain, too, is commonly increased by heat.

The effusion into the joints is principally serum, with a little lymph, but it never becomes purulent. In cases of some duration, the synovial membranes and ligaments are sometimes thickened, and even the ends of the bones enlarged. This, however, is a more frequent occurrence in sub-acute cases, where the smaller joints are affected, and is more common in women than in men.

The fever generally abates in about three weeks, but it is generally twice that time before the disease has fairly abated.

The sub-acute form is attended with some degree of fever, some swelling, and considerable pain, particularly at night, but the frequent change from one part to another is no longer marked. Indeed, the affection, for a considerable time, is often limited to individual parts, as a knee or shoulder. When it is confined to the muscles of the loins, it is called lumbago.

Chronic rheumatism occurs in the same parts as the acute, but is distinguished from it by the absence of fever, by the pain being increased by cold, but relieved by heat, and by its long and indefinite duration. Muscular parts that have been long affected, often waste very considerably. The chronic form is remarkably aggravated by cold and moisture.

Notwithstanding the intense pain of this disease, it is not at all dangerous, excepting in the cases, which are unfortunately too common, of the translation of the disease to the heart itself, or to its pericardium or lining membrane. This is more common in youth than in a more advanced age. Sometimes the

disease attacks the heart slowly and insidiously, and does not leave the joints; but at other times the heart affection comes on suddenly, and the malady as suddenly recedes from the extremities. This latter is the much more dangerous form of the two.

When asked what was good for acute rheumatism, Dr. Warren replied, "Six weeks;" and so many plans have been tried, and the authors of them have alike boasted of their successes and also deplored their failures, that this would appear, in some degree, correct. Still there can be no doubt but that we possess means of mitigating the violence of the disease, preventing it from running into an obstinate chronic form, and of putting the body into such a state, that a termination may, perhaps, sooner take place.

Bloodletting, in this disease, has had many advocates, and great benefit has often followed its employment. But, if carried to any extent, it tends to promote the metastasis of the disease to the heart. This has been denied, but no negative observations can be allowed to prevail over opposite positive ones. And when we know that inflammation is so apt to seize upon an organ in a state of unusual weakness, we are not astonished to see rheumatism fly to a heart, upon which an immediate debilitating effect has just been produced. However, in cases where there is much ardent fever, with a hard pulse, a moderate bleeding may with safety be employed, and local bleedings are always free from this objection.

The medicine upon which most dependence is to be placed is colchicum, and it is best administered along with magnesia. It produces vomiting and diarrhoea, and often, when these come on, the disease disappears. Opium, or still better, some preparation of morphia, should be regularly administered, to lull the violent pain of the disease.

Calomel has been much employed, and, used in a particular manner, seemed to be useful, particularly in the practice of the late Dr. Hope. Others have combined opium with it, and pushed the remedy until salivation came on, and the result has often been manifestly injurious.

In the sub-acute form, we often derive great benefit from blisters. Frequently, also, rheumatism distinctly intermits, in which case we may expect benefit to follow the exhibition of quinine. If not, we may try colchicum, always remembering, to use also magnesia, or other alkalies, to counteract the acid state of the system. It, as well as the chronic form, often yields to hydriodate of potash.

In chronic rheumatism, a great variety of remedies have been tried, often without any success. The most important are, warm clothing, hot baths, friction, and the administration of the hydriodate of potash, or sometimes of arsenic.

CHAPTER XXII.

GOUT.

THE gout was well known both to the Greeks and Romans, and appears to have received about as much sympathy in their days as in our own. It is generally a hereditary disease, but some persons seem to acquire it. It is principally confined to men, and those females who are attacked by it are generally such as are of robust or full habits of body. It is disposed especially to attack men who have large and robust bodies, large heads, and whose skin has a coarse surface. It is a disease of middle and after life, rarely occurring before the age of thirty-five. The exciting causes are, first, those which induce a plethoric habit of body; and, secondly, those which, in plethoric bodies, produce a state of debility.

In this first class, Cullen enumerates, a sedentary manner of life, a full diet of animal food, with the large use of fermented liquors. Among the examples of the second are, a fit of intemperance, indigestion, intense application to study or to business, night-watching, and the sudden change from a full to a spare diet.

The attacks usually begin about two or three o'clock in the morning. The paroxysm commences with a pain affecting one foot, and mostly confined to the ball or first joint of the big toe. This commencement of the pain is usually attended with shivering. This suddenness of the attack in the night-time, when the person had gone to bed, quite unsuspecting of what was going to happen, was well known to the ancients. The nurse in Lucian's 'Triumph of the Gout' thus describes it:—

"Healthful he came,
And all unwounded, home; and greedily
The evening feast devoured, and drained the bowl;
Then, falling on the couch, securely slept.
But at midnight, awaking, loud he roared,
As smitten by some god. Fear seized us all.
'And, oh!' he cried, 'whence came this dire mischance?
'Some torturing demon seizes on my foot.'
Thus, on his couch, upsitting all night long,
His foot, in sad solemnity, he moaned."

After the shivering, the body becomes heated, and the pain goes on increasing until it becomes almost intolerable. "Place," says a Frenchman, "your foot in a

winch, and screw the vice up until you can endure it no longer. This may represent rheumatism. Then give the instrument another twist, and you will obtain a notion of gout." The pain is aggravated by the slightest pressure, even by the jar of a heavy footstep across the patient's apartment. It continues until next midnight, when the pain abates, sometimes all at once, and allows the sufferer to fall asleep; and when he wakes he finds the affected part red and swollen. The same set of symptoms, but in a mitigated degree, occur for the next few days, and then the disease often goes off, not to return for an interval of years. It has often been stated, that a person, after such an attack, enjoys greater ease and alacrity in the functions of both body and mind than he had previously experienced. Such an attack is generally preceded by symptoms of indigestion and acidity of the stomach.

The patient may now remain well, or at any rate free from gout, for a period of years; but in the course of three or four years he is almost certain to experience another attack; and after this the intervals of freedom from it are shorter, and the attacks will, perhaps, come on every year, then every half-year, and at last frequently in the year. The pains become less violent, but each seizure is now more protracted, so that sometimes the patient is never quite free from the gout. It attacks, too, a greater variety of joints, and especially larger ones.

The morbid matter is deposited, in some cases, in concretions, which are improperly called chalkstones. They are principally composed of lithic acid, combined with soda. These generally lie directly underneath the skin. They often lead to very troublesome ulcers.

Sometimes, in cases of gout, two events, both to be exceedingly dreaded, occur. The inflammation may suddenly leave the foot, and this local affection is exchanged for a violent pain in the stomach, with great depression of the circulation. This is called retrocedent gout. At other times the head or the lungs may become affected.

These facts have made practitioners cautious of interfering with a paroxysm of gout, for fear that their meddling might cause it to recede. Sydenham discountenanced all evacuating remedies. He said that it was nature's prerogative to exterminate the peccant matter in her own way, which was by depositing it into the joints, whence it might be dispersed by insensible transpiration. All the effect of evacuant remedies was to call back into the blood this peccant matter, by which means, instead of being deposited in the joints, it fell upon some of the viscera, and the patient's life, before in no danger, is put in peril. Even Cullen yielded to this expectant treatment, and concluded that the best thing to do was to commit the sick man "to patience and flannel alone." It is still believed that bloodletting, strong purgatives, &c., would, in many cases, prove very injurious; but there is one medicine, colchicum, which, judiciously employed, is attended with no bad consequences, and which alleviates the pain

and shortens the paroxysm in a manner often very remarkable. It is best combined with alkalis.

The treatment, in the intervals, is chiefly regimenal. This regimen must consist of a diet composed but sparingly of animal matter, great moderation with regard to wine and other fermented drinks, and much habitual exercise. Along with these, antacids and bitters may be used; but without this regimen, all tonic medicine, whether Portland powder, or any of the many which have been recommended, are of no service in warding off the attack of gout.

CHAPTER XXIII.

INFLAMMATORY SKIN DISEASES.

IN measles, scarlet fever, &c., there is an inflammatory eruption upon the skin, but in such diseases, and they are called exanthematous, the disorder is evidently an acute one of the system, and, as we shall afterwards see, dependent upon the reception of a poison into the circulation, and the affection of the skin is merely transient and unimportant. This class of diseases will be more conveniently discussed after we have had continued fever brought before our notice. But, besides these, the skin is subject to a great number of affections of an inflammatory character, although each one of them has a certain specific nature. To these we will now for a short time turn our attention.

In the rose, or erysipelas, the fever shows itself before the skin inflames; but there is an inflammation of the skin, called erythema, which is excited by the ordinary remote causes of inflammation. In it the skin becomes very red, little blisters form upon it, the inflammation often extends into the cellular tissue beneath it, where it either leads to a deposition of lymph, which, being slowly absorbed, and often, too, imperfectly, gives rise to permanent enlargement of the affected part, or, as is more frequently the case, to the formation of pus, bounded by lymph, and therefore contained in abscesses.

At other times, particularly when the cause of the inflammation has been a dissection puncture, implying the reception into the system of morbid matter, no lymph is formed, and the purulent effusion is diffusely extended through the cellular tissue. In these cases the accompanying fever is generally of a typhoid nature.

Two very slight inflammations, with hardly any effusion, are seen in the rose-rash, so often observed to attack children when teething, and nettle-rash,

which occurs in some adults after having taken some articles of food which has disagreed with their stomachs. Of these, shell-fish is perhaps the commonest. With many people, pepper taken to any extent brings on an attack; with others, bitter almonds and many other substances. An hour or two after having eaten any of these substances, nausea is felt, giddiness is complained of, and then the rash comes out.

There are many cases of inflammation of the skin and subcutaneous tissue which are circumscribed, and go on regularly to the formation of pus. The common name for such is a boil. These boils are sometimes very annoying, coming on in crops, and causing considerable pain and irritation. It is needless to describe the course of a boil, from the first appearance of redness to the discharge of matter, and afterwards of a little slough.

In certain constitutions, generally in those of a weak and irritable habit, the boil changes into a much more serious affection, to which the name of carbuncle has been given. A carbuncle is a large, flat, circumscribed, hard, very painful tumour, of a livid red colour. It may be three or four inches in diameter. It ends in the formation of a large slough. Before the slough forms, a number of small cells, filled with pus, can be seen. Surgeons are in the habit of making long deep incisions into a carbuncle. This operation is attended with extreme pain, and its utility in many cases very questionable. Attending to the general health, and using fomentations, are perhaps the best modes of treatment.

Another form of inflammation of the skin, running almost certainly to a fatal termination, is produced by the poison of the glanders of the horse. It is attended with the deposition of tubercles upon the skin, similar to those seen in the affected horse.

There are other suppurating inflammations of the skin, but the affected portions are small. To such the name of ecthyma is given. Scabies, or itch, is of this nature, but it is probably always produced by an insect.

There are again other inflammations of the skin, which only go the length of exuding serum. To one form of these the name of eczema is given. A singular form of this is the shingles, or, to use its scientific name, herpes zoster. The name shingles is probably derived from *cingulum*, a girdle. At any rate the eruption does resemble a girdle, or rather half a one; and, generally speaking, it is confined to the right side. There is a very old but mistaken opinion, that if it go all round the body it proves fatal. "Zoster appellatur," says Pliny, "et enecat si cinxerit." The eruption consists of red patches, upon each of which stand large vesicles. If care be taken not to rub off the heads of the vesicles, and thus convert them into sores, it gets well in a fortnight.

Another form of inflammatory skin disease is known by the tendency to secrete neither serum nor pus, but a peculiar dry exudation. The most common example of this is the disease called lepra. It consists of red scaly patches,

always more or less of a circular shape, scattered over different parts of the body. It usually begins upon the limbs, most commonly near the knees or elbows. The patches then multiply, enlarge in size, and extend along to the trunk. Lepra occurs only in a certain habit of body, and is compatible with perfect good health in other respects. It often occurs without any obvious cause, and, after very various periods, often spontaneously abates; but, in this latter case, it is very apt to recur.

There are other inflammatory affections of the skin, and also many other skin diseases which do not seem to be inflammatory, but rather constitutional perversions of nutrition, which at no time partake of an inflammatory condition. All that we have enumerated, however, although prone to pass very soon into a very chronic state, which may continue a long time, yet begin by inflammation, accompanied by much fever, and are remarkably benefited by antiphlogistic treatment. Of these, the most useful are bloodletting and saline purgatives.

When the disease has become chronic, it has also generally become very intractable to treatment. Our first object is to put the general system into as healthy a state as possible. Very frequently we will find that the secretions of the stomach, liver, and bowels are out of order. Great benefit often follows the use of warm bathing, particularly in the scaly diseases. Alkalies are generally serviceable. The class of alterative tonics, such as iodine, arsenic, sarsaparilla, and the like, should be tried for some time. Various local applications, some stimulating, others to relieve the itching, are often called for. The most useful of the latter is a weak solution of chloride of lime. Above all things, strict attention should be paid to extreme cleanliness.

CHAPTER XXIV.

FEVER.

WE have now considered the pathology and treatment of inflammation in general, and also described the inflammations of the more important organs of the body. We have seen that, along with the local changes that took place in these, fever was lit up in the system, which fever followed, and was evidently produced by, the local inflammation. But febrile diseases attack man which are totally independent of inflammation or any local changes whatever, although such are often mixed up with and modified by them. These are termed fever proper, or idiopathic fever. This class of diseases has very particular

claims upon our attention, inasmuch as, especially among the poor, it is one of the most fertile sources of death; and its causes are generally held to be more or less remediable. Of late years, great attention has been paid to this latter subject, and the legislature has determined to interfere regarding it. Unfortunately, not only do medical men differ as to the causes, but as to almost every point of the pathology of this very common disease. We trust, however, to be able to give our readers a rational notion of it.

Before going into any detail, we will describe the symptoms and phenomena of fever. A man is affected with languor, an oppressive feeling of debility, and an inability to perform any muscular motions. At the same time his face and extremities become pale, and the skin all over the body is shrunk and contracted. The extremities may be felt by another person to be a little cooler than natural, but the individual himself is scarcely aware of it. In a little, however, he feels a sensation of cold, first in his back, but afterwards all over his body; but to another person he at this time feels warmer than natural. This sense of coldness produces violent rigors, or shiverings. Then these become less violent, and alternate with warm flushings. By degrees the cold fit goes entirely off, and is replaced by an unnatural heat. The skin burns, and the face flushes, and the contracted skin becomes turgid. This state lasts for some time, until at length a moisture appears upon the brow, which, extending over the whole body, becomes a perspiration. The heat then ceases, and, after a little time, so does the perspiration; and the body, although feeling weak, returns to its natural condition. This succession of stages—cold, hot, and sweating—constitutes what is called a paroxysm. During it many of the functions of the body are remarkably affected. Upon the first approach of languor, the pulse is always weaker than before. During the cold stage it is still smaller, much more frequent, and often irregular; while, as the hot stage comes on, it often becomes hard, bounding, and full, and with the perspiration returns to its natural state. During the whole of the paroxysm, there is not only want of appetite, but loathing for all food. Often, too, there is much nausea and vomiting. Thirst accompanies the whole of the paroxysm. Then, during the cold stage, there is diminution of sensibility, but often considerable increase of it during the hot. With regard to the intellectual functions, from the early part of the cold, the mind can no longer fix itself upon any train of thought. This want of the power of attention increases; and during the hot stage often degenerates into delirium. Pain in the back, limbs, and especially in the head, is felt often very severely, from the commencement of the cold fit to the breaking out of the perspiration.

Such are the principal phenomena which we witness during a paroxysm of fever, and such is their ordinary concourse and succession. It is to be observed, however, that in different cases these phenomena are in different degrees, that

the series or succession is more or less complete, and that the different stages bear a different proportion to each other. Still our description will be found to apply to fever in general.

An attack of fever is hardly ever confined to one paroxysm. After a certain interval, another paroxysm comes on precisely the same as the one which preceded it. The space of time between these paroxysms is called an intermission. When the paroxysm and intermissions are very distinctly marked, the fever, by way of distinction, is called the intermittent fever, or, vulgarly, the ague. The time that elapses between the commencement of one paroxysm and that of another, is called the interval. These intervals, in a single attack, are nearly equal in length; but in different cases they are of different lengths. The most common interval is forty-eight hours. This is named the tertian period. The next most common is seventy-two hours, and this is called the quartan. If it be only twenty-four hours, we call it the quotidian.

We have next to remark, that, in some cases of fever, repeated paroxysms may be distinctly observed, but the intermission is not perfect and entire. This class of fevers has the name of remittent given to it. Such are often seen in children. In other cases the remission is inconsiderable, often not attended with perspiration, and the paroxysm is principally confined to an increase or exaggeration of the hot fit. These cases often continue two or three weeks, and they are called continued fevers. Such constitute the great proportion of fever cases in this country. One variety of them, afterwards to be described, is termed typhus.

Another important class of fevers is distinguished, in other respects of the continued kind, by being always attended with an eruption upon the skin. The name of this class of fevers is the exanthematous, and it includes measles, small-pox, scarlet fever, probably the plague, and other diseases.

Having now acquired a general notion of the phenomena of fever, we proceed to examine some of them more minutely, and also to consider other particulars connected with their pathology. We shall first consider, at greater length, the symptoms and varieties of idiopathic fever; we shall then state the morbid appearances found upon dissection in fatal cases; next turn our attention to the highly important and interesting subject of the remote causes of fever; and then to the fatal mode of termination in them, and their pathology. We shall, lastly, make some observations upon their treatment.

1. *The symptoms and varieties of Idiopathic Fever.*—Many attempts have been made to prove that idiopathic fever was merely the sympathetic fever of some inflammation. The organs supposed to be inflamed are variously stated. One physician supposed that it was the brain, and the French pathologists, since the time of Broussais, have maintained that the whole disease depended upon inflammation of the little glands of the mucous membrane of the intes-

tines. But there are many cases of disease having all the symptoms which we have described above, and in which no local symptoms at all are present. Nay, what is more, there are many cases, admitted on all hands to be decided cases of fever, which terminate fatally, and in which, upon dissection, no local change of brain, intestines, or any organ whatever, is to be found. Besides, in fever, we have, in almost every case, more or less of the typhoid form. Now, this is not the same kind of fever which accompanies inflammation in general; and it may, indeed, always be considered as the result of a cause distinct from mere local inflammation.

The pulse, in the typhoid form, is almost always, if not from the beginning, at least from an early period of the disease, much feebler than in inflammatory fever. In other words, in idiopathic fever, there is often a peculiar depressing influence exerted upon the circulation. The secretions, too, are more modified than in inflammatory fever, as we see instanced in the thick black fur which covers the tongue and lips. Besides, the nervous system is much more depressed in idiopathic fever; and this, too, from a very early period. There is a greater tendency to confusion and to stupor—there is trembling of the limbs and tongue, and twitching of the tendons, even when no exertion is made; the external senses, particularly that of hearing, are more dulled, and the delirium is of a different character to that of inflammatory fever. It is of a low muttering kind, and the patient is hardly ever violent. The blood of a patient suffering from typhoid fever differs widely from that of inflammatory. Instead of the buffy coat, and other indications of a strong power of coagulation, we find that it possesses hardly any power of coagulating at all; and sometimes, indeed, none at all. It is from this cause that we witness, in typhoid fever cases, symptoms of putrescency, as it is called; *i. e.*, mortification from slight irritation, passive hemorrhage, and little exudations of the blood under the skin, forming small purple patches, called petechiæ. In many cases, too, in the fevers usually called exanthematous, there is a specific eruption upon the skin.

Idiopathic fever, also, is less under the influence of remedies, and gets well with less assistance from remedies than inflammatory fever. We are not sure that we may not add, that it gets better more than inflammatory does in spite of bad treatment. Moreover, there is much less risk of organic disease than when recovery takes place from an equally disordered state of the system, consequent on decided internal inflammation.

One remarkable peculiarity of idiopathic fevers is, that they are frequently absent from a community, even a large one, for a length of time, and at other times are extremely prevalent. This proves that they are not excited by causes of mere local and temporary agency, as inflammations are. We shall afterwards find, that one set—the intermittent—take their origin from exhalation.

tions from the earth, or malaria; and that the others are propagated by contagion.

Setting aside the exanthematous fevers, there are some very well-marked varieties of idiopathic fever. One of these, fortunately of rare occurrence, has been denominated the congestive form. In it the depressing effect of the first or cold stage is remarkably intense. The surface is cold, the pulse very feeble, the nervous system much depressed, and fatal coma may come on. These symptoms are sometimes accompanied by spasms, sometimes by severe vomiting. In the ordinary fevers of temperate climates, this form of fever is rare; but in tropical countries it is more frequently met with, as in the plague, the yellow fever, &c. We may remark, that many cases of epidemic or Asiatic cholera were very analogous to this form of fever. When this distressed state is recovered from, the febrile reaction of the hot stage is very ill marked.

Exactly opposite to this is the inflammatory form of fever. In this the depression in the cold stage is little, and the reaction of the hot very great, as indicated by the hot and flushed skin, the quick, hard, and bounding pulse, the intense thirst, the violent headache, the excited senses, and the comparatively violent delirium. This form of fever has not, for many years past, been common in this country.

The name of typhoid is given to the commonest form of fever in this country. In it, after the febrile reaction has been set up, the typhoid symptoms which we just alluded to are seen. Of this kind three varieties have been described, but which often are noticed to run into one another. When the symptoms denote principally debility of the vital actions, without the functions of the nervous system being much affected, the case is styled one of low fever; while, when the nervous system is more than usually affected, as indicated by inability to sleep, restlessness, tremors, deafness, much stupor, contracted pupil, &c., the disease is often called nervous fever, or, vulgarly, brain fever. On the other hand, when the more obvious symptoms denote the dissolved state of the blood, when petechiæ, hæmorrhage, and gangrene are very easily induced, we term the case one of putrid fever.

Notwithstanding that fever is perfectly independent of any inflammation, yet various inflammations are often combined with it; and in this country the danger to be apprehended is from the combination of one or more of these local affections with the typhoid state of the system, particularly with the enfeebled state of the circulation. Inflammation, however, is much modified by the presence of typhoid fever. The pain attending it is much less acute, and its progress is much slower, and otherwise altered; the effusion of lymph and pus being much less than in inflammations proper. In the same manner, if a person suffering, for instance, from a large ulcer upon his skin take fever, the appear-

ance of the ulcer is, as long as the fever lasts, much changed, and often the discharge from it ceases.

Inflammation of the brain, but of a very sub-acute form, is an occasional accompaniment of the continued fever of this country, and is probably more frequent in that of hotter climates. More frequently, especially in winter and spring, cases of fever, complicated with pneumonia or bronchitis, are met with; and when this happens, the inflammation is always considerably modified, and little under the influence of remedies, and scarcely ever subsides until the abatement of the fever. Sometimes, in temperate latitudes, we have inflammation of the liver, as instanced by pain, nausea, vomiting, &c., while in hot ones it is a very common complication. Occasionally we see inflammation of the stomach. But by far the most common inflammation which occurs in this country during the course of fever, is that of the mucous coat of the intestines, and of the mucous glands, sometimes indeed going on to ulceration, which may perforate their coats, and thus induce fatal peritonitis.

After the symptoms of fever have abated, and the patient has become convalescent, his system is still in a state of great weakness; and hence, in accordance with the law we have so often seen illustrated, of debility being a powerful predisposing cause to disease, a fever convalescent is peculiarly liable to attacks of inflammation. Scrofulous affections, in those predisposed to them, often come on during the convalescence of fever; and after agues, enlargements of the spleen and liver are apt to take place; on the other hand, as occasionally happens after most acute diseases, the constitution sometimes seems to be strengthened and improved by an attack of fever.

2. *Morbid appearances in fatal cases of Fever.*—Fatal cases of fever occur in which no morbid appearance whatever is to be found. Within the head, the most frequent morbid appearance is a preternatural effusion of serum, and a congested state of the vessels; and, in a few cases, there is a clot of blood found effused. Similar appearances are sometimes found in the spinal cord. In like manner, a considerable quantity of serum is occasionally present in the lungs; but we must observe, that this, as well as that in the brain, is not always the result of inflammation, but a mere mechanical separation of the serum, owing to the languid flow of the blood through these organs during the latter hours of life. It is to this cause that we find the serum in the most dependant portion of the lung. When, however, we find it in such parts as do not lie lowest, we are certain that it has an inflammatory origin. In the lungs, too, the blood is generally found to be much more fluid than natural. Distinct marks of inflammation of the mucous coats of the bowels are often found varying from simple congestion to large ulcers; but these appearances vary very much in the frequency with which they are found, both in different places, and at different seasons.

3. *Causes of Fever.*—The remote causes of idiopathic fevers have recently

engaged a great deal of public attention, and hence we shall make no apology for entering rather fully into the consideration of them. We may first observe, that all of them—intermittent, remittent, continued, and exanthematous—come in epidemics. They prevail generally, attack many people in succession at certain places and seasons, and then disappear, not to return again, in some instances, for centuries. The common continued fever of this country, however, never entirely disappears from a large city or community, at any rate for any considerable time. Now, we will venture to assert, that the exciting cause of intermittent and remittent fever is a malaria arising from the ground; hence, that fevers of this class prevail only in certain localities which resemble each other; and at a distance from these, intercourse of the healthy with the sick is innocent; and that the cause of continued and excessive fevers is an effluvia from the bodies of those who are affected with them, or contagion.

That intermittent and remittent fevers are excited by malaria, is pretty generally admitted.* We will merely, then, point out the laws which have been ascertained to regulate it, and its influence upon the human economy. It appears to be produced in places where water, long stagnant, has been slowly evaporated by the heat of the sun. It was for a long time supposed that decay of vegetable matter was necessary for its formation; but this is certainly an untenable opinion. In the first place, no such malaria is produced by the decomposition of vegetable matter; and, what is of more consequence, this poison may abound where actually there is no vegetation at all. This has been most satisfactorily proved by Sir William Ferguson, from whom we quote some of the occurrences which led him to form such an opinion. Our army in Holland, at the commencement of the French war, was, after a hot and dry summer, encamped at Rosendaal. Here the soil was a dry level plain of sand, where, with the exception of a few stunted heaths, no vegetation did or could exist. Water was universally found within a few inches of its surface, which, so far from being putrid, was agreeable to the palate. Yet here, ague and remittent fevers prevailed to a great extent. At Walcheren, where, perhaps, our army suffered more from disease than it did at any other place, precisely the same condition of soil existed. In 1809, in the Peninsula, several of our regiments encamped in a hilly ravine, formerly a rivulet, but which now only contained pools of water among its rocks, so pure, that the soldiers were anxious to bivouac near them for the sake of using it; yet, before morning, several of the men were attacked with remittent fever. Again, after the battle of Talavera, the army retreated along the course of the Guadiana, and the country was so dry and arid for want of rain, that this river had ceased to be a stream, but was merely a continuation of pools. There, most malignant remit-

* This is not quite correct, as they have been held to be contagious.

tent fever attacked the troops. At Ciudad Rodrigo, situated on the rocky bank of a clear stream, and where the low land, after having been flooded, was become as dry as a brickfield, with the vegetation utterly destroyed, the same result, a most malignant epidemic of remittent fever, seized upon our men. In fact, "in the most unhealthy parts of Spain, we may, in vain, towards the close of the summer, look for lakes, marshes, ditches, pools, or even vegetation. Spain, generally speaking, is then as prolific of remittent fever as Walcheren, beyond all doubt one of the driest countries of Europe; and it is not till it has been again made one of the wettest, by the periodical rains, with its vegetation and aquatic weeds restored, that it can be called healthy, or even habitable, with any degree of safety." We, ourselves, have had ample opportunities, from communications from parties resident in Spain, of confirming this statement.

One more remarkable instance, that putrefying vegetation has nothing to do with the production of malaria, we will quote. At Lisbon, one bank of the Tagus is healthy, and the other remarkably the reverse. The former is a bare hilly country, with free open watercourses among the hills; the land upon the other side is perfectly flat and sandy, and this Alentego land, as it is called, is superficially as dry. Upon the Lisbon side of the river are numerous gardens, where water is kept during the three summer months' drought in store reservoirs. This water becomes dreadfully putrid, and yet is placed close to the houses and sleeping-rooms of the inhabitants. "Yet no one ever heard or dreamt of fever being generated among them from such a source, though the most ignorant native is well aware, that were he only to cross the river and sleep on the sandy shores of the Alentego, where a particle of water has not been seen for months, and where water, being absorbed into the sand as soon as it fell, was never known to be putrid, he would run the greatest risk of being seized with remittent fever." We may conclude that malaria depends upon an absorbing surface being saturated with moisture, and then more or less quickly dried. We can easily understand from this, that a proper system of drainage will effectually remove this scourge from a country. And in point of fact, this has been done in many parts of our own country. In London, for instance, ague is now never or very rarely met with. Even so short a while since as Sydenham's time, it was a very frequent and very fatal disease. James the First, and Oliver Cromwell, both died of it. This freedom from the effects of malaria is doubtless owing to drainage.

The influence of malaria does not rise high above the surface emitting it, and when it does, the higher it goes the less virulent is the disease excited by it. A very striking example of this was afforded by what happened to our garrison at Antigua, which was distributed into three barracks, respectively six hundred, five hundred, and three hundred feet above the level of the marshes. The dockyard was upon a level with them. Now, it often happened that the sen-

tincl at the dockyard was seized by the most violent yellow fever while at his guard-box. Many of the inhabitants of the lowest barrack were attacked with a milder form of remittent fever, while the occupants of the other two barracks almost entirely escaped malarious disease.

Notwithstanding that the heat of the sun seems to be the great cause of the production of malaria, yet its mid-day heat or light has the power of dissipating or diluting it. Thus, all malarious districts are much more dangerous at night than in the daytime. To sleep in the open air at night in such places, is sure to bring on the disease. Many curious illustrations of this might be given. It has, for instance, often been remarked, that sailors, whose ship is lying off a malarious coast, escape the disease, notwithstanding they wander about the shore in the daytime, while those who remain all night from their ship almost infallibly take the disease.

Malaria can undoubtedly be conveyed from one place to another by means of the wind. A curious illustration of this is related by Lancisi, the Italian physician, who first perceived the existence of malaria. Thirty ladies and gentlemen were sailing for pleasure at the mouth of the Tiber. The wind began to blow from the north, and over a marshy tract of land situate to windward of them. Twenty-nine of the thirty took tertian ague.

Another very remarkable fact connected with malaria is, that water has the power of absorbing or neutralizing it. Ships have been known to lie but a thousand yards off the shore, where intermittent fever was raging, and when the wind was blowing from the shore, and yet remain quite healthy.

Another astonishing property of the malaria is, its tendency to attach itself to trees. On this account it is, in malarious places, very dangerous to go near trees. On the other hand, if such be situate between a marshy place and a town or encampment, they serve as a protection, by absorbing the poisonous matter. Lancisi supposes, ingeniously enough, that it was to this preservative influence of trees, and to the consequent desire that they should not be cut down, that groves began to be considered as sacred.

Independently of the influence of drainage, it has been supposed that cultivation, and the increase or crowding, as it were, of population, diminishes the morbid effect of this poisonous exhalation. And, certainly, it has sometimes seemed wonderfully to increase when fertile lands have been laid waste.

Residents in malarious places become frequently acclimatized to it; and the natives are generally observed to enjoy an immunity from it, which foreigners do not. Any debilitating cause strongly predisposes persons to take the disease, if malaria be present; and what may seem very strange, an individual who has once had ague, may, although he has years ago removed

from the marshy place, again experience the disease after exposure to cold or disorder of the stomach.

Although we have alluded to cases where the disease came on immediately after exposure to the cause, yet, in the majority of cases, the poison lies dormant in the system for a considerable length of time—sometimes, perhaps, almost so long as a couple of years.

Pathologists, unfortunately, are by no means agreed as to the causes of continued fever. Still those physicians who have had by far the most ample opportunities of studying the disease, *i. e.*, those practising in the large cities of Ireland and Scotland, are unanimous enough regarding them. Their opinion is, that ordinarily continued fever is excited by a contagion arising from the body of an individual previously affected, and that depressing causes strongly predispose to it. They further think that, practically, the great depressing cause is poverty, and they point with confidence to famines, bad harvests, and the like, which press very heavily upon the working population, as almost invariably preceding an epidemic. The various arguments and proofs urged by these gentlemen we shall soon detail. We will first, however, consider an opposite opinion as to the cause of fever, recently urged by some very eminent medical men, but whose opportunities of watching the origin and progress of epidemics of fever have certainly not been so great. It is, that the predisposing and exciting causes of continued fever are malaria from putrid animal and vegetable matter, as in sewers, &c., and the emanations from people crowding together. They think that, in this manner, some particular poison is formed which produces fever in the human constitution. They appear to have been led to this conclusion, from observing that fever generally occurred among people much exposed to such. Their opinion has been almost universally adopted, at any rate by the non-professional public of this country. There are, however, some facts in the history of fever which agree remarkably ill with this theory.

In the first place, it is, as we have before stated, well known that fevers occur in epidemics. The disease will rage for two or three months, attacking every second or third person in a certain locality, and then almost entirely disappear from it for a long time—in this country very variable, but perhaps, upon an average, three years or longer. But the malaria from putrid matter and animal emanations is the same always—as much in intensity when the fever is absent, and no more when it is raging. Again, as the decomposition of animal and vegetable substances takes place, with rapidity proportional to the warmth and moisture, if this decomposition produced fever, we would naturally expect that the fever would prevail in proportion to the intensity of the warmth and moisture. Such, however, is by no means the case. We may take the case of Edinburgh upon this point. The following table shows

the number of fever patients admitted into the Infirmary of that city,* a sure criterion of the amount of fever in the town, and also the state of the weather.

1840.	Number of Fever Patients.	Maximum of Thermometer.	Rain Gauge.
July,	79	64·09	3·46
August,	62	67·71	1·19
September,	65	59·23	2·39
October,	64	53·03	2·01
November,	77	47·73	2·33
December,	118	41·71	0·68
1841.			
January,	155	39·13	1·23
February,	146	42·60	1·64
March,	107	50·09	0·58
April,	93	53·13	1·14
May,	102	61·35	1·14
June,	100	62·57	1·55

Now, this table—and it accords with many others—does not agree with the malaria theory. The greatest number of fever patients occur in January, February, and December, when there is least moisture and heat. In fact, fever is almost always much more prevalent during the winter months.

Passing by many other facts in the history of continued fever, which certainly do not seem compatible with the theory of its origin in malaria, we next proceed to observe that it appears to us, that the maintainers of this theory have not been careful to obtain any evidence of the connection between fever and malaria more than their co-existence together. Fever, it is admitted on all hands, principally occurs among those classes of our population who certainly do live in very crowded rooms, and in ill-drained houses, often filled with the most disagreeable emanations from decaying matter. But this does not prove that the emanations cause the fever. Gout, for instance, is a disease which occurs almost entirely among people who live in well-ventilated houses, with an abundant supply of good air; but no one thinks that the ventilation and drainage at once predispose to and excite gout. In order to prove that such malaria excites continued fever, evidence should be obtained that wherever, or nearly always wherever, such malaria existed in great intensity, fever was produced; and we have a right to demand, in addition, some proof that, in localities where the supposed cause has been removed, the fever has ceased. This, however, has scarcely been attempted. On the contrary, we can adduce many instances of very great accumulations of decomposing animal and vegetable matter in places where fever was either altogether absent, or where it increased in a less degree than in other and cleaner parts.

Many nations, for instance, habitually live in the midst of every kind of

* The table was, we believe, drawn up by the late Dr. Reid, then governor of that institution, afterwards Professor of Anatomy in the University of St. Andrews.

filth, and consequently breathe a most offensive atmosphere, and yet among them fever is very rare. The natives of Oonalaska and Kamschatka live in subterraneous holes called yourts, each consisting of a small room, in which half-a-dozen families are generally crowded. In them, too, they store their provisions for the winter. These provisions mainly consist of fish, which is half putrid, and the odour arising from it is horrible. Now, these people are little liable to fever. Indeed, in a list of the diseases to which the Kamschatkians are subject, fever is omitted. Travellers who have visited Greenland in winter describe an almost similar state of matters. The Greenlanders live in small and crowded apartments, and adopt every means in their power to exclude ventilation. Yet fever among them is a rare disorder. Nor are such examples confined to cold countries. There is, for instance, Port St. Francisco, on the north-west coast of America. Speaking of the inhabitants of this place, La Perouse says "their cabins possess a nastiness and stench to which the den of no known animal in the world can possibly be compared, and yet they enjoy uninterrupted health." Some years ago, in Edinburgh, a city dreadfully devastated by continued fever, the localities in which there was much malaria had actually less fever cases than others in which the malaria was less. Upon the east side of that town are some marshes filled with putrid animal matter, and exhaling the most disgusting odours. Situated almost immediately upon these are the cavalry barracks. Yet these very barracks are, or at any rate were, the healthiest and freest from fever of any in Scotland. Also, situated upon them there is a little village called Restalrig. In the year 1839, only one family in it were attacked by fever, and in this case communication with a person previously diseased was clearly to be traced. It is a curious fact, that Restalrig is an uncommonly healthy village, and many instances of longevity have happened in it. Yet it is situate upon the sewers of Edinburgh.

Vapours, nastier than any which can be found in the alleys of London, are constantly present in the immense dissecting-rooms of Paris. In these, thousands of bodies are annually dissected, and where great inattention is paid to cleanliness, and yet the neighbourhood is not liable to fever. Neither are the servants of these places; on the contrary, they are, to use the words of Du Chatelot, "singularly free from febrile diseases." We have even a stronger instance of people living free from fever in the midst of malaria from putrid matter, in the condition of the inhabitants of Montfaçon. The abominations here are too disgusting to be described. Among its minor ones, we may mention that there is here a manufactory of music-strings, &c., from the entrails of horses. About twelve thousand of these animals are annually killed in this place, not the slightest attention being paid to avoid or diminish the horrid smells arising from their putrid bodies. Yet the inhabitants—men, women, and

children—enjoy good health, although the latter are sometimes cradled “*dans l'intérieure d'une carcasse comme dans une berceau.*”

Nowhere, perhaps, are people more crowded together in ill-ventilated places, and more exposed to animal malaria, than in the African slave ships, and yet fever is uncommon among their miserable inmates.

Moreover, there are many instances of persons being much engaged among the putrefying bodies of the dead, and yet not being liable to fever. Such has often happened in exhumations. Towards the close of the last century, there were two of these at Dunkirk. In one of them, a space of two acres had been raised ten feet by the deposition of dead bodies. In removing it, two years were consumed; and although nausea and threatenings of asphyxia, from the putrid emanations, were complained of by the workmen, yet none of them took fever, neither did the inhabitants of the neighbourhood of the work. Did our space permit, we could enumerate a great number of similar instances; and we could also adduce many of people engaged in trades which exposed them to highly concentrated animal miasmata, and who yet are not liable to fever.

Of course there is no one who does not deplore the want of drainage, the filth, and the crowding of many parts of our large towns. Nor can any one deny that this crowding, supposing fever to attack one individual, tends to promote its spread among the rest. But it does not appear that fever is ever, or, at any rate, commonly excited by emanations from putrid matter; and it is probable that enforcing better drainage, &c., will not be found, particularly among adults, to materially affect the mortality of large cities.

Let us now inquire if there is any better proof that contagion is the exciting cause of continued fever. “Some years ago,” says Dr. Alison, “at a time when there was no great number of fever cases in Edinburgh, I met with a case in the son of a shoemaker, who was lying in a room in which his father and two apprentices were at work. I could not prevail upon the father to remove his son to the hospital, although I stated the danger of the apprentices being attacked. Within two or three weeks after, I found that the two apprentices were lying ill of fever in their own houses—one of them two hundred yards, the other half a mile distant from the workshop, and widely distant from each other. These young men likewise lay at home during the fever, and each of their cases was speedily followed by a succession of others in the inhabitants of the rooms which they occupied, and of those immediately adjoining, who had never been at the workshop. In one of these houses, seven, and in the other twelve, were thus affected. Now, on the supposition of the fever being contagious, all this was to be expected, and all corresponded with the predictions which were hazarded on that belief. But on the supposition of such succession of fever cases depending on miasmata, there must have been two, more probably three, separate and accidentally occurring miasmata, to explain the phenomenon here

observed—one at the workshop, and one at each of the houses of the apprentices ; and there must have been this extraordinary coincidence, that at each of these last the malaria sprang up just at a time when a patient was lying ill there of fever, which he had apparently contracted elsewhere. Further, the three houses in which these successions of fever cases were observed, are in situations very different from one another ; and all of them have been, to my knowledge, perfectly free from fever for years together, both before and since that time, notwithstanding that fever has been much more generally prevalent, and that they have been inhabited by successive families. What probability is there that these separate miasmata should have arisen in these three houses, just at the time when their presence was required in each to produce an effect which had been foretold as the consequence of another cause, undeniably operating upon all ?”

In fact, the spreading of fever among those, and those only, who have intercourse with the sick, is a fact which cannot be controverted. Out of a hundred fever patients, eighty will tell you the day, and the hour, and the place, when they saw the infected man ; and, upon further inquiry, the remaining twenty will be discovered to have had such intercourse, although they may have forgot it. And most striking illustrations of the influence of contagion in propagating continued fever may be drawn from what takes place in hospitals. If a non-fever patient be allowed to enter a convalescent fever ward, he is almost certain to catch the fever. The immense majority of the nurses who attend upon the fever patients have the disease, while those who wait upon other patients have not. It is to be remembered, too, that in hospitals now-a-days such attention is paid to cleanliness and ventilation, that the possibility of the presence of putrid animal malaria is out of the question. The same happens to the medical students who act as clerks, and to the physicians, particularly when, as happens in a bad epidemic, many patients are confined to a ward. “In this hospital,” says Dr. Welsh, referring to one in Edinburgh, “since it was opened, my friends, Messrs. Stevenson and Christison, the matron, two apothecaries in succession, the shop-boy, the washerwoman, and thirty-eight nurses, have been infected, and four of the nurses have died. With the exception of two or three nurses, who have been but a short time in the hospital, I am the only person who has not caught the disease, either here or at the Infirmary, within the last eight or ten months.”

We will only add one more fact relative to contagion. Every physician but one (Dr. Tweedie) of the London fever-house has been attacked with fever. Also the resident medical officers, matrons, porters, laundresses, servants, and nurses, have one and all had it. In this case, it would be very absurd to suppose a malaria in the fever-house ; but even if any one were inclined to do so, he would be met with the opposing statement, that the small-pox hospital, close by, is remarkably free from fever.

It is only in very severe epidemics that fever spreads so remarkably and

certainly among the attendants. And the fact that contagion in our large towns always exists, and yet that the amount of fever is very different at different times, proves that there must be some predisposing cause or causes, the existence of which, in fact, produces the epidemic. This predisposing cause cannot be malaria, inasmuch as this is as much present one year as another. We think we are entitled to say, that the same debilitating causes which we have seen predispose so much to inflammation and disease in general, also remarkably predispose to continued fever, as well as the other varieties of fever. In the chapter upon the 'Causes of Disease,' we purposely deferred, until now, two or three tables, showing the great difference in the chance of life among the different classes of society. We extract them from an early volume of the Sanatory Reports:—

Number of Deaths in Truro.				Average Age at Death.			
33	-	-	-	Gentry,	-	-	40
138	-	-	-	Tradespeople,	-	-	33
447	-	-	-	Labourers,	-	-	28
Number of Deaths in Derby.				Average Age at Death.			
10	-	-	-	Gentry,	-	-	49
125	-	-	-	Tradespeople,	-	-	38
752	-	-	-	Labourers,	-	-	21
Number of Deaths in Bolton.				Average Age at Death.			
103	-	-	-	Gentry,	-	-	34
381	-	-	-	Tradespeople,	-	-	23
2232	-	-	-	Labourers,	-	-	18
Number of Deaths in Bethnal-Green.				Average Age at Death.			
101	-	-	-	Gentry,	-	-	45
278	-	-	-	Tradespeople,	-	-	26
1558	-	-	-	Labourers	-	-	16
Number of Deaths in Liverpool.				Average Age at Death.			
137	-	-	-	Gentry,	-	-	35
1738	-	-	-	Tradespeople,	-	-	22
5597	-	-	-	Labourers,	-	-	15

We might multiply tables of this kind *ad infinitum*, and in all of them we would find that the life of the labourer was much shorter than that of the class higher in the social chain. As we know that one great cause of this increased mortality among the poor is fever, we might confidently refer to such tables in proof of our assertion, that such poverty as is actually experienced by the labouring classes in this country strongly predisposes to fever. We will, however, produce more definite evidence. We will show that unusual poverty has preceded great epidemics, that fever has attacked those who have suffered from that poverty, and that it has passed over those who were not exposed to such poverty.

Our sister country (Ireland) has, unfortunately, suffered very severely from the ravages of fever. We possess an admirable work upon the epidemics of that

country, by Drs. Barker and Cheyne. These gentlemen have collected particulars regarding many epidemics. In 1708, an epidemic commenced, which continued for a year or two, and the winter of that year "was the severest that had happened after 1683. Another began to rage in 1728." After three bad harvests, when oatmeal, the chief food of the poor of the north, rose to an extravagant price, and when food riots were taking place in the south, and when, in Dublin, "numbers of housekeepers were obliged to beg for bread in the streets," fever became epidemic. In 1739-40, a "calamitous frost" set in, which destroyed many cattle and crops, caused the birds and animals, stinted for food, to perish "*denso agmine*," and rotted the potatoes. The poverty which followed was most complete. Corn was six times its ordinary price, and "great numbers of the poor perished." In the spring and summer following, the fever "increased alarmingly." It raged in Leinster, Ulster, and Connaught; but in Munster, where the poor were said to be still "more scantily supplied with provisions," the mortality was greatest.

The year 1797 was healthy, but much rain following in the autumn, the peasantry were prevented from gathering their turf. This was followed by a "considerable increase of fever;" but in 1798, 1799, 1800, and 1801, Ireland was visited by an epidemic of fever, perhaps the most dreadful she ever experienced. Now, during these years, a combination of causes produced extreme destitution among the people. "Nothing could be more distressing than the state of society in Ireland at this period." "The poor were deprived of employment." There was, in 1799, "an almost general deficiency of the crops, and a consequent failure of the usual supply of nourishment to the poor, already suffering under many privations." "The state of the poor (in these four years) was wretched in the extreme." In 1800, the harvest was again bad, and "a further extension of disease followed." In 1801, the military report states, "that fever, of a dangerous and frequently fatal kind, prevails, which is ascribable to a deficiency in the usual quantity of food." The destitution, and consequently the fever, lasted until 1802. "The epidemic, shortly after (the autumn of 1802), began to decline, but not before the good effects of an unusually plentiful harvest, in again furnishing provisions of all kinds to the poor, at a moderate rate, had been felt."

Fever increased remarkably in Ireland in 1815. The previous winter had been very severe, and was followed by a bad harvest. In 1816, the harvest was again deficient, the corn being much spoiled, and a great part of the potato crop a failure. The year following was as bad, and the effects of these harvests now began to be severely felt. In some places, the poor lived upon nettles, wild mustard, and other wild herbs; and in others, they were glad to obtain the putrid fish cast upon the shore. From peculiar circumstances, employment became difficult to be obtained, and the wages were much lower. These events

"induced those whose attention was directed to the public health, to expect an increase of fever." Their fears, unfortunately, proved to be too justly founded. Out of six millions of the entire population, Dr. Barker calculates that a million and a half were attacked with fever. In some parts of Munster, three-fourths of the population had the disease. The mortality was very great, about sixty-five thousand perishing. At the same time that Ireland was suffering so severely, many parts of the Continent were similarly attacked; and "in all these instances, scarcity of food, the consequence of the failure of the crop of the preceding year, had greatly contributed to further the progress of the fever."

The provincial physicians of Ireland forwarded reports of this particular epidemic to Dr. Barker, and almost every one of them points out destitution as the invariable precursor of the epidemic in question. The conclusion that this talented physician came to regarding it is, "that it commenced, in most parts of the province, about the end of 1816, or beginning of 1817, with the scarcity of provisions, and general distress consequent thereon, and that the peculiar circumstances of the people, from want of employment, have generally furthered its progress. As to the preventive means to be adopted, in order to obviate its further increase or recurrence, it is obvious that every measure serving to better the condition of the people, and to diminish pauperism and mendicity, must have a tendency to render fever less frequent, by removing causes which favour its progress."

During the first forty years of the present century, the city of Edinburgh was visited by three epidemics—one in 1817, another in 1826, and a third in 1836. Each was preceded by causes producing destitution among the poor. For two years before 1817, not only were the wages lower, owing to peace prices taking the place of war ones, but there were two bad harvests. Previous to the epidemic of 1826, there was great commercial distress, which not only in Edinburgh affected the resident population, but had also the effect of sending into this town great numbers of destitute people from other parts of Scotland.* There was also a local cause of distress. Building speculations had been very extensively entered into, and given employment to large numbers. In this year they were entirely stopped. Again, the condition of the working classes was rendered very bad, previous to and about 1836, by the depressed state of trade, especially about Dundee and Glasgow. Local changes also increased the distress. Precisely similar events took place in the other large towns of Scotland.

We may observe, too, that the facts in the history of fever, which we mentioned as not corresponding with the theory of its origin in malaria, are remarkably explained by this fact, of its being predisposed to by destitution. Thus,

* Before the alteration in the poor-law, Edinburgh was almost the only place in Scotland where poor relief, of any amount, was given.

its ravages are greatest in winter, when the animal malaria is least, but when poverty is most severely felt.

We may remark, too, with regard to Ireland, that when the last distressing famine began in that country, many physicians prophesied an immense increase of fever. That this prediction has been verified is, unfortunately, matter of notoriety.

To make the chain of evidence upon this point complete, it is necessary to ascertain if the classes not exposed to destitution are, comparatively, exempt from fever. Its absence, or at least comparative absence, from the very places we have just seen it present in, when food is cheap and employment abundant, and its less frequency in English towns, where the poor are much better off than in the Irish and Scotch, furnish strong arguments that such is the case. But the strongest argument is to be drawn from the exemption of the wealthy in the same place where the poor are attacked. In fact, among the higher classes, fever is a rare disease. In the work of Drs. Barker and Cheyne, it is stated by almost all the medical men who furnished them with the reports, that the higher classes, although, when attacked, they had the disease very severely, were in general exempt. Thus Dr. Barker, in his account of the progress of the fever in Munster, states, "that its prevalence had been much greater in the lower than in the upper classes of society, among whom, at that time, no case of fever was known to exist, although, during last summer, and about twelve months previously, it had appeared occasionally." In Connaught, "the soldiers were exempt, and few among the better classes had fever." In Clare, we are told that the soldiers and better classes escaped. So in Roscommon, Mayo, Sligo, and indeed every other place. Very different this from what happened among the poor in these places, where one in four was attacked!

To resume, we have endeavoured to show that the malaria of putrid matters, arising from bad ventilation and drainage, and the emanations from people being crowded together, have nothing to do with the production of continued fever, but that it is spread by means of contagion, in those whose systems have been debilitated, and that the great debilitating agent, in a practical point of view, is destitution. We would not have dwelt so long upon this subject, but that the legislature and the public have taken this matter up; and it appeared not improper to state, in a popular treatise like this, those arguments which have been urged against the opinions generally entertained in England upon the important subject of the cause of continued fever.

Notwithstanding that these are the usual causes of continued fever, it does not follow that it does not sometimes spontaneously originate. And it has been thought that it occasionally does so, after long-continued mental depression and anxiety, especially during youth.

With regard to the laws which seem to regulate contagion, we may first

observe, that the little morbid matter which enters the system in the course of the fever is most wonderfully increased—somewhat similar to the manner in which, in a common brewing, a large quantity of yeast is formed by the addition to the wort of a very small portion. It appears to be at one time more virulent than at another. Its contagious nature is readily diffused through the air, but it seems to lose its dangerous properties by dilution, and to become innocuous at the distance, at the most, of twenty or thirty yards. It is believed by many to attach itself to clothes, and the like. A heat of the temperature of a hundred and twenty degrees destroys its injurious properties; and this is, perhaps, the reason why continued fever is such a rare disease in tropical countries. It generally lies latent in the system, after having been received into it, before the fever shows itself, and one attack of a contagious febrile disease is a strong preservative from any future one. Lastly, in different epidemics, its effects are variously altered, and to this the name of the type of the epidemic is given.

4. *Pathology of Fever.*—The pathology of fever appears essentially to consist in the reception into the body of a depressing poison—a malaria in the case of remittent and intermittent fever, a contagion in the continued and in the exanthemata—and which, if it do not prove fatal, after a time loses its power. There is, moreover, a diseased action excited in the system, of the nature of modified local inflammation. The morbid effect of the poison probably takes place, primarily, upon the nervous system; but this is a very disputed question, which it would be quite out of place to discuss here, and we proceed to the treatment of fever.

5. *Treatment of Fever.*—Nothing is so difficult as the treatment of fever. The physician who knows how to treat it well, knows how to treat every disease. The great object to keep before us is, to “obviate the tendency to death”—that is, to see before us the series of morbid changes, to determine in what way they threaten to prove fatal, and to adopt such means as are in our power to prevent them. The first thing to be done is to place the patient under the antiphlogistic regimen, *i.e.*, in this case to enjoin rest and quiet, and plenty of mild liquids to drink. We do this, because we know by experience that the opposite to these aggravate the febrile symptoms. But the rigorous contradiction to little fancies for food is, probably, injudicious. If a patient who has a strong craving for an apple or a piece of salt meat be refused, the refusal, in his weak and excited state, often increases the fever; and it will be found that if his wish be gratified, he is, in ninety-nine cases out of a hundred, satisfied with a very small bit. A free admission of fresh air is also undoubtedly desirable; but there should be care taken that the patient should not be placed in a draught, for fear that local inflammations be excited. With these means, with the aid of a little laxative medicine, we may, when fever occurs in a young person, in the majority of cases, expect a spontaneously favourable termination.

In adults, and in many younger patients, however, things cannot be expected to go on so favourably. In the first place, it is necessary to consider the type of the epidemic. In some, death evidently takes place by coma, and the pulse is pretty good to the last; in such, evacuations will be found to be generally well borne; while in others, death is threatened in the way of syncope, and evacuations bring on sinking, and stimulants are given with benefit even from the commencement. Then it has been thought, that, if we see a case at the very commencement, before the hot-stage reaction has been fairly developed, we may cut short the disease by an emetic, followed by a purgative and diaphoretic. In this way, some are of opinion that the noxious matter is, as it were, expelled the system. Although fever is probably never, by these means, cut short, yet some such plan is almost always, at the very outset of the disease, useful by removing many uneasy sensations. The affusion with cold water is generally a dangerous application, and likely to bring on local affections.

Generally, however, we do not see the patient until the hot stage is fairly established. In this case, if there be intense headache, sleeplessness, intolerance of light; and if, from the nature of the epidemic, we think that there is danger of coma, from effusion into the brain coming on at an early period, we venture upon a general bleeding. But such an occurrence is rare—most epidemics are characterized by a depression of all the vital powers; and even when death is threatened by coma, it is not from sthenic inflammatory effusion. We, therefore, in these cases, apply a few leeches, shave the hair of the head, and also give slightly-nauseating doses of tartar emetic. After a day or two, we venture upon a little opium at bed-time; but if there be much comatose tendency, we must omit this. When much tendency to coma is present, it is often relieved by the application of large blisters to the head.

We treat the local inflammations with blisters, and their associate remedies, but generally find it necessary to avoid depletion.

In the majority of cases which we now see, death is threatened by syncope, and we find it necessary to administer wine often from an early period.

The intermittent fevers possess a specific—bark, or quinine. When this fails, arsenic is often successful.

Were we to describe the treatment of fever properly in detail, we would occupy much more space than we have to bestow. The treatment of disease can never be undertaken by any one who has not devoted years to the study of it. It is not that which we attempt to explain in this volume. We merely essay to narrate the general principles of medicine in popular language. Accordingly we here, as we have upon former occasions, devote less time to the treatment than to the other parts of the subject before us.

CHAPTER XXV.

THE EXANTHEMATOUS FEVERS.

THESE fevers resemble the continued fever, to which we have just devoted so much space, in being excited by a contagion, in each one of them, of a certain specific nature, and in the general fever being usually more or less of a typhoid nature. In addition to these, there is in them an eruption on the skin, and a great tendency to internal inflammations, particularly of the mucous membranes. The danger in them consists in these internal inflammations, and partly in the depressing effect which the contagion has upon the system in general, and the circulation in particular. They are remarkable also for running a more uniform course than continued fever, and for their course being generally shorter than that of this disease. This class of fevers takes in the small-pox, the chicken-pox, measles, scarlet fever, and plague. And this description which we have given of them applies, in most respects, to the erysipelas, or rose. This latter disease, however, at times, arises independently of contagion—so also, but much more rarely, the scarlet fever appears to do; but the small-pox, measles, and plague, never arise from any other cause but the application to the body of their specific contagion. One attack of them is an almost guarantee of immunity for the future. We now proceed, in as brief a space as possible, to describe the phenomena of the different exanthemata.

1. *Small-pox*.—After receiving the contagion of small-pox, the disease remains latent or hatching for a period, generally varying from seven to twelve days. Then smart fever, sometimes attended with delirium, sets in, and unusual pain is commonly felt in the back. On the third day of this fever an eruption makes its appearance, first on the face, then on the neck, arms, and trunk of the body; and lastly, upon the legs and thighs. This eruption consists at first of little pimples, which ripen into pustules, which are mature upon the eighth day after their first appearance; and this day they begin to break and form scabs, which in four or five days tumble off. When the eruption has been very severe, upon the eighth day, secondary fever, as it is called, comes on, and often proves fatal.

As a general rule, the danger in the disease depends upon the number of pustules. When there are but few, they are separate from each other, and the danger is very trifling. When, however, there are many, and when they run

into one another, the disease is called confluent, and the danger of death is very imminent.

The internal local affections are inflammations of the trachea and bronchi, and sometimes of the substance of the lungs. The stomach and intestines are rarely complicated.

One curious fact in the history of small-pox is, that when the disease has nearly or entirely subsided, inflammation, going on very rapidly to the formation of pus, is apt to occur in various organs; generally in the cellular tissue under the skin, but occasionally in the eye, the pleura, joints, &c. We had before occasion to allude to this.

The chief danger in small-pox is of death by syncope, but which is usually attended with much comatose tendency. Sometimes, if the air-passage be much affected, the dyspnoea may notably aggravate the danger.

The treatment of small-pox is, in principle, the same as that of continued fever. Mild, and afterwards slightly stimulating liniments often relieve the itching of the skin and pustules.

In those who have been vaccinated, small-pox sometimes occurs, but always of a mild kind; and the pustules rarely form pus, but shrink and become abortive.

Chicken-pox is a mild disease, which runs its course in four or five days; and the vesicles attain their full size in forty-eight hours, and do not go on to the formation of pus.

Small-pox used to be the cause of a great part of the whole mortality. Now, however, it is a small one. Its contagious properties are so great, that almost every individual in the course of his lifetime had the disease, and often, as may easily be supposed, under most unfavourable circumstances. Hence, more than a century ago, the custom of communicating the disease to a previously prepared person, by inoculating him with a little small-pox matter, was introduced into Europe. The mortality in small-pox so excited is about one death in four hundred cases; while, in natural small-pox, one man in four dies. This system of inoculation was practised in the East before it was tried in Europe; and a somewhat analogous plan has been followed in that most extraordinary country, China, for centuries. It is always, however, open to one objection. Although tolerably safe to the individual, it introduces the disease into the neighbourhood of the man who submits to it, and, in point of fact, its use increased the mortality from small-pox. Happily, however, there is no further need for it, since the discovery of vaccination by Dr. Jenner. This great physician had, early in life, his attention called to a notion of the peasantry of Gloucestershire, that there existed a local disease among cows, which, if communicated to man, gave a protection against the small-pox. For many years he investigated this subject, and the idea of propagating the disease

from the cow to one human being, and from him in succession through other men, struck him. On the 14th of May, 1796, "the birth-day of vaccination," a child eight years old was vaccinated with matter taken from the hands of a milker, who had received it from a cow. The child passed through the trifling disease thus excited quite satisfactorily, and on the first day of July following, was inoculated with small-pox matter without any result following. Dr. Jenner delayed making public the result of his researches, that he might strengthen his opinion by farther experiments; and it was not until 1798 that he published his work upon the subject. It was then proved that the disease is not original in the cows, but is communicated to their udders by the matter which is exuded from that disease in the foot of a horse, known by the name of grease. Dr. Jenner's opinions were universally received, and vaccination was everywhere practised. As a mark of gratitude, the House of Commons voted Dr. Jenner thirty thousand pounds. It may be safely stated, that its good effects in guarding people from the contagion of small-pox have been very great, but it cannot be denied that it sometimes fails. It is, perhaps, always prudent to adopt the plan of re-vaccination.

2. *Measles*.—This disease sets in with fever, attended with an inflammatory condition of the mucous membrane of the nose and eyes, which gives rise to the characteristic sneezing and increased flow of tears. The eruption makes its appearance about the fourth day, but it is not very uniform. It is distinguished by its appearing in brown red patches, arranged in a crescentic form, which begin on the face, extend to the rest of the body, and fade upon the fourth day. The mucous membranes of the lungs and larynx are generally inflamed; that of the bowels is also liable to become affected.

The measles do not often assume a typhoid form of fever, but in some epidemics, and in debilitated individuals, the general fever is of this nature.

The danger of the disease in this last-mentioned class of cases, is from the depressing effects of the typhoid fever, but in general it is from the bronchitis.

The treatment of measles calls for no particular remark. The number of deaths occurring from this cause in the metropolis in one year, was eleven hundred and ninety-two.

3. *Scarlet Fever*.—Under this head, as before stated, we shall also consider the malignant sore throat. Scarlet fever, or scarlatina, is a contagious febrile disease, characterised by a florid scarlet rash, often extending over the whole body, and an inflammation of the mucous membrane of the nose, fauces, and tonsils, in which latter organs the inflammation often goes on to ulceration, and sometimes to mortification. The glands underneath the angle of the jaw are also often inflamed.

No disease, perhaps, so remarkably differs in its danger and severity in different cases and epidemics, as scarlet fever. Sometimes both the fever and

the throat affection are very mild, while at others they are typhoid and malignant.

The progress of the disease is short. The rash generally appears on the second day of the fever, and goes away upon the fifth. Death has been known to take place within the first twenty-four hours, but most of the fatal cases may be stated to occur between the third and seventh day.

The appearance of the tongue in scarlet fever is very characteristic. It is covered with a white thick fur, through which we can see the red papillæ projecting, but in a little the fur clears away, and the surface of the tongue presents an intense redness.

The eruption is variable in its appearance. Sometimes it is partial, and has not the usual florid look. Such is usually attended with great depression and sinking. When, on the other hand, it appears soon, remains long, and is florid, the accompanying fever is of an inflammatory kind. Both these rules are subject in different cases to many variations. In some cases, again, there is every symptom of scarlet fever except the eruption. To this variety the name of malignant sore throat is given.

The danger to be apprehended from scarlet fever is asphyxia, from the swelling up of the air-passages, or sinking from the extreme typhoid fever which may prevail. The deaths from this disease in London in one year, were twelve hundred and twenty-four, and we presume that by this is meant, that that number died while the proper symptoms of fever were present. A great number of deaths and of serious affections, however, occur, as the sequelæ of scarlet fever. After the febrile symptoms have disappeared, the inflammation of the throat may pass into the larynx, and cause a disease similar to croup, or it may extend from the back of the mouth to the ears, and produce incurable deafness, or the enlarged glands under the jaw may ulcerate, and form sloughs.

But even when the fever, the eruption, and the throat symptoms have left the patient, he is still liable to most important consequences, particularly when great pains are not taken to screen him from exposure to cold. Sometimes inflammation of the joints, with a tendency to the rapid effusion of pus; sometimes inflammation of the lungs, pleura, or peritoneum, and often, along with these, general dropsy, make their appearance. Even when all these are escaped, phthisis frequently comes on. All this proves the powerfully depressing effect which scarlet fever exerts upon the system. Moreover, the granular degeneration of the kidney, before alluded to, as being frequently the result of inflammation of that organ, is often induced in the convalescence of scarlatina.

Of course, the treatment of scarlatina will vary in different epidemics and in different cases.

4. *Erysipelas* or *Rose*.—This inflammation of the skin differs from erythema, before described, in being preceded by febrile symptoms for two or three days,

in this fever having a tendency to become typhoid, in being contagious, and often prevailing epidemically. Generally speaking, the exciting cause of rose is a wound or cut; but in many cases it commences without having been preceded by any mechanical injury, and after exposure to cold.

In these latter cases, it usually commences about the head, very frequently at the ears or brow. From this it extends over the whole head, the swelling causing closure of the eyelids. It may then proceed to all parts of the body, and sometimes it extends along the inside of the nose to the fauces. About the head, the inflammation generally tends to effusion of serum; but on the extremities, there is often much pus secreted, attended with sloughing.

The fever is sometimes decidedly inflammatory, and death takes place by way of coma, the pulse continuing full to the last; but in other cases, and more generally, the fever is typhoid, with sinking of the powers of life, soft pulse, and low muttering delirium; and the fatal termination, if in the way of coma, is to be attributed to the exudation of serum upon the brain from the weakness of the circulation, and not to inflammatory effusion.

Sometimes the external inflammation suddenly disappears, and wild delirium and coma come on, indicating metastasis to the brain.

From these few remarks, it will be seen that the mode of fatal termination to be feared, and therefore the practice to be adopted, will vary remarkably in different cases. The local treatment appears to consist in secluding the inflamed skin from the air. This is done by means of flour, cotton, or poultices. And the addition of a warm solution of opium and acetate of lead to the latter, often gives great relief to the uneasy sensation of the affected part.

5. *The Plague*.—"The plague," says Cullen, "is a disease which always arises from contagion, which affects many persons about the same time, proves fatal to great numbers, generally produces fever, and, in most persons, is attended with buboes, or carbuncles." The most malignant cases of it resemble the congestive fever before alluded to; the powers of the system are very much depressed, and death may take place within twenty-four hours after the commencement, and before the eruptions, *i.e.*, the carbuncles, appear. In less malignant cases, there is febrile reaction with the eruption, which may last some days, and then the patient may either recover, or the case may prove fatal in the same manner as typhoid fever does. Again, there is a third class of cases, in which there is nothing but the local affection, and no constitutional disturbance whatever.

No reasonable doubt can be entertained of the contagious nature of plague, and hence the quarantine laws, however faulty they may be in detail, are, in principle, absolutely indispensable for preserving a nation from this fearful scourge.*

* See Chapter XXXII. in this Part.

CHAPTER XXVI.

GENERAL OBSERVATIONS UPON NON-FEBRILE OR CHRONIC DISEASES.

We have now rapidly described the principal phenomena which characterize those diseases of the human body which are attended by febrile symptoms. We have next to consider the still more numerous class which are not accompanied by any such appearances, and which are usually termed chronic, but more correctly non-febrile, disorders. As it will be impossible to go much into detail respecting them, we will, previously to rapidly glancing at the most important of them, make some few general observations upon chronic diseases.

It is always important to bear in mind the distinction formerly stated between functional and organic disease, and between these and malignant, remembering, however, that organic disease is always, and necessarily, preceded by functional.

There are a great many modes of diseased functional action. The important and fundamental function of involuntary muscular contraction may, in various ways, be altered. It may be increased, diminished, or rendered irregular; and also that state in it, called mobility, or prostration, with excitement—in which it may be very easily excited, but quickly fail in energy—may be induced. We have examples of these changes in all parts of the body where involuntary muscular motion exists, and particularly in the heart. The usual causes of such are either increase or diminution of the natural stimuli, or impressions upon the nervous system, affecting the irritability of muscular parts.

Another common functional disorder is, alterations in the capillary circulation of various parts, especially of the mucous membranes and the parenchymatous viscera. When the quantity of blood is in excess, we call the state of local congestion one of plethora, and when the reverse happens, one of anæmia. Local congestions are often produced by local irritations, either physical or mental, suppression of usual evacuations, &c. And, as may easily be conceived, they are very much favoured by organic disease previously existing and disturbing the circulation. These local congestions very often lead to hemorrhages and dropsies. The manner in which they do so is obvious.

Functional disease, again, frequently consists in an alteration of the secretion

of various parts. Sometimes the natural secretion of an organ is in excess, sometimes in deficiency, and at others altered in its nature. In some chronic diseases, the blood itself has its constitution altered. One of the most striking examples of this occurs in scurvy.

Another very important class of functional diseases consists in affections of the nervous system. The nature of these changes is unknown, but they are shown by various pains and uneasy sensations; by various spasms, as in hysteria, hiccup, &c.; and by disorders of the mental faculties, as spectral illusions, delirium, and madness.

One class of organic diseases is not attended by the formation of any new growth, but merely depends upon alterations of the size and consistency of parts. When a natural texture is enlarged, this state is termed hypertrophy. Of hypertrophy, there would seem to be two principal kinds. In the one, the hypertrophy is caused by increased vital action of the parts, and more deserves the name of a healing provision of nature than that of a disease. Thus, if there is any obstruction to the flow of blood from the heart, this organ becomes hypertrophied, and therefore stronger; or if one lung or kidney become diseased, the other soon grows bigger. In the other class, hypertrophy takes place from the lymph thrown out by inflammation becoming organized, or from the specific action of certain substances in the circulation altering the nutrition of local parts. We have an instance of this latter in the Derbyshire neck.

When a living texture becomes diminished in size, we say that it is affected with atrophy. Such an organic disease is produced by want of use, *i.e.*, by the opposite to that which produced hypertrophy. At other times, it is the consequence of increased absorption from pressure. Certain substances, when taken into the circulation, have the power of producing atrophy of certain organs. These, of course, we administer in cases of hypertrophy. Iodine is the most important of them.

Sometimes we find, as an organic disease, preternatural softening, or hardening, as the case may be, of various textures, depending upon a perversion of nutrition of the parts affected.

The various tumours, when not composed of heterogeneous matter, constitute another class of organic diseases. It is unnecessary to describe here the different varieties of them. Unless such growths mechanically impede some important function, they often remain stationary for a very long time without injuring the general health.

As for the more important class of malignant growths, where the matter deposited is unlike any substance found in the healthy body, we may first of all remark, that they have a constitutional origin, and often are simultaneously deposited in different parts of the body; and it has been observed by Dr. Budd,

that they have a remarkable tendency to a symmetrical arrangement. The adventitious matter often shows itself in the swelling of the lymphatic glands, leading from the part where the deposit has taken place, and has sometimes been detected in the veins. These facts clearly prove the contamination of the blood by the morbid matter; and indeed, if the affected part, in these cases, be removed with the knife, the disease frequently makes its appearance in another part.

Of such deposits, the most important are the scrofulous tubercle, already considered; the granular deposits, formerly alluded to as occurring in the kidneys, but which are also of frequent occurrence in the valves of the heart, and in other places; the deposit of black matter, called melanosis; that of brain-like matter, called encephaloid; and the hard, fibrous-like substance, called scirrhus, almost inevitably passing into the intractable ulcer—cancer.

Contrary to the common opinion, we may remark, that pain does not necessarily accompany any organic disease; that when it is acute, it is often from pressure having been made upon a nerve; and that, in those cases in which it does form a prominent symptom, it is often, and for long periods, absent.

In all probability, the great proportion of chronic diseases have grown with the growth of civilization, and are therefore, in many cases, produced by causes over which we have control. Nothing, then, can be of more service than to determine, accurately and precisely, the causes, both exciting and predisposing, of such diseases. This has, unfortunately, not been done, and medical men have, in general, been content with vague generalities. We will lay before our readers a brief outline of what has been ascertained upon this point.

It is impossible, with the knowledge we at present possess, to distinguish, in the majority of cases of chronic disease, between their predisposing and their exciting causes. The two may be referred to alterations in the condition of the blood, and to impressions made upon the nervous system. The blood is so altered as to become a cause of disease, by deficient or improper aliment, by a defective condition of the digestive secretions, by a defective state of the arterialization of the blood from want of exercise, rendering the circulation languid, and, in some degree, from deterioration of the air itself, from injurious matter intended for secretion being retained in it, and by those changes in its nature which produce in it tubercles, cancer, &c., or the tendency to hemorrhage.

With regard to impressions made upon the nervous system, and which produce chronic disease, the most important are either the violent exciting emotions, as anger or joy, or the long continuance of depressing ones, as anxiety or despondency. These have, undoubtedly, a great effect in altering the secretions, particularly those of the organs of digestion and assimilation. Again, impressions which produce pain or uneasiness, often, by a sort of reflex action, induce some of these chronic diseases. When some of such causes affect the

whole system, the disease is often very distinctly localized. In this manner, heat undoubtedly produces disease, generally chronic, of the liver.

The causes of chronic disease differ very much in the poorer and in the higher classes of society. Among the poor, the great causes of chronic disease are privations, insufficient food, clothing, and fire; also, insufficient exercise, in many cases, both of the mind and body, and an insufficient supply of pure air. To these we must add, in many cases, excessive muscular exertion, and depression of mind, especially from want of employment. Among the higher classes, there is more to be feared from excessive mental exertion, and habits of too good living and luxury. But many of this class also suffer from the ill effects of moral and physical idleness, and the want of mental excitement; and with these are often coupled, excess of food and sleep.

It is very important to remember, that tendencies to disease, acquired by such habits, are liable to be extended and perpetuated by hereditary transmission.

The good effects of remedies are not so well seen in chronic as in febrile diseases; but the natural, spontaneous tendency to a cure, can very often be seen and promoted. Even in malignant disease, which, once developed in the system, may be said never to be cured, very remarkable intermissions, often capable, by art, of extension, may be observed.

Generally speaking, our object, in the treatment of chronic disease, is to keep up the strength of the system, so that, in those cases which admit of a cure, the healing powers of nature may exercise their full play: in other words, we employ the tonic regimen; but in particular cases, which we will afterwards consider, particular plans of treatment are to be followed. In other instances, where a cure is impossible, what we have to do is to alleviate pain and uneasiness, and to free the dying-bed from all the suffering which it lies within our powers to avert.

CHAPTER XXVII.

CHRONIC DISEASES OF THE LUNGS AND AIR-PASSAGES.

CHRONIC diseases of the lungs, altogether independently of inflammation and tubercular deposition and softening already described, are comparatively rare. Chronic bronchitis is often attended with much spasm, asthma, or with emphysema of the lungs. There are, however, a few diseases of the lungs and air-passages, of a non-febrile nature. There is a spasmodic disease of the larynx, which, in its crowing inspiration, resembles croup, but which is distinguished from that disease by its temporary nature, and the absence of all fever. Something of this kind has been known to occur in adults, but the most frequent form in which it is met with is in infants. It is in these cases termed spasmodic croup, laryngismus stridulus, &c. It generally comes on when the child is sleeping, or immediately after it has awoken—soon abates, and is apt to recur. It is in the great majority of cases purely of a functional character, aggravated by impressions made upon the extremity of nerves, not of the larynx, as in dentition or disordered stomach, for instance. It generally occurs, too, in *mobile* constitutions. This form of it requires a tonic treatment, antispasmodic medicines, and such means as are calculated to remove the causes of the local irritations at the extremities of the nerves of the gum, stomach, &c.

Another form of laryngismus stridulus, however, depends upon pressure being made upon the nerve going to the larynx, generally in children, by swellings of the bronchial glands. In this case we use leeches, &c., and afterwards iodine.

Another functional disease of the lungs is hemorrhage, independently of tubercular or other inflammation. It will be more convenient to make a few remarks upon this disease afterwards.

The lungs are liable occasionally to become the seat of malignant deposits; but such cannot, during life, be distinguished from phthisis.

Tumours, sometimes malignant, more frequently not so, occasionally grow about the larynx, giving rise to apparently inflammatory symptoms, attended with much spasm. These, sometimes, are so bad as to demand the operation of tracheotomy; at other times, they yield to mercury and iodine; and at others, subside or remain stationary—impeding the breathing, but not injuring the general health.

CHAPTER XXVIII.

CHRONIC DISEASES OF ORGANS OF CIRCULATION.

WE will, under this head, first consider the functional diseases of the heart, next the organic ones, and then those disorders of the capillary circulation which produce exhalations from the blood—in other words, hemorrhages and dropsies.

The functional diseases of the heart consist of alterations of its muscular contractility. Sometimes this is diminished, and we have syncope; sometimes increased, as in palpitation, and at other times painful, forming the disease known by the name of angina pectoris. Besides occurring independently of organic change, these are also met with in consequence of the organic changes to which this organ is liable.

We have often had occasion to allude to death beginning at the heart, or death by syncope. When life is threatened in this way, the pulse is feeble, muscular power is lost, and the surface is cold, and often covered with perspiration, which usually begins upon the brow. When the cause producing syncope acts very slowly, so that the quantity of blood circulating in the nervous centres is very gradually diminished, the pulse may almost cease, and the skin become quite cold, before the external senses are affected, or the intellect impaired. The sight is commonly the first sense that begins to give way. The pulsations of the heart, as they become feebler, generally become increased in frequency. But if the heart's action is suddenly depressed, either by sudden and violent hemorrhage,* or the like, we behold a very different set of phenomena. There are flashings of light before the eyes, singing in the ears, confusion of thought, and instantaneous loss of sensation, intellect, and voluntary motion, even when the pulse is quite perceptible, and the surface not very cold. In this case the pulsations of the heart are slow as well as feeble. This kind of syncope is seen after a full bloodletting. Thus, the insensibility of syncope is not simply a part of the failure of the general vital actions from loss of blood, but dependent upon the *shock* given to the nervous system. Conversely, a sudden diminution of the pressure upon the brain induces syncope.

It is further to be observed, that in this last-described form of syncope, the act of respiration can be suspended for some time without injury.

In considering syncope as a functional disease of the heart, we have not to

* Diminishing the pressure upon the brain.

deal with it as the last phenomenon in many diseases, but under the comparatively trifling disorder usually called fainting fits. These usually occur in people of a very mobile disposition, upon whose nervous system slight causes produce great effects. Hence such are frequently met with in women, particularly those of a nervous habit, individuals weakened by fasting or disease, or in those who have laboured under long-continued mental depression.

The exciting causes of fainting fits are strong emotions, as of joy or sorrow, disagreeable sights, and, in many cases, particular odours and closeness of the air of an apartment.

The treatment of a fainting fit consists in placing the person in the horizontal posture and dashing water upon the face, and applying salts to the nostrils to excite inspiration. To prevent a threatening fit from coming on, in addition to these means we administer small quantities of stimuli—wine, ammonia, aromatic oils, &c.

Palpitations of the heart are a very common functional disease, totally untended with danger, but which, from the disagreeable sensations which they excite, and still more from the apprehension that they are symptomatic of organic disease, often cause great uneasiness. In the perfectly healthy state, violent exercise and mental emotion bring them on; but in enfeebled and nervous people, a very slight cause is sufficient to induce them. They are very frequently produced by disorder of the digestive organs, particularly when attended with flatulence, and at other times are evidently dependent upon fulness of blood. In some cases there is mere increase of pulsations, but in others there is much irregularity. The treatment must be directed to remove the cause. In those produced by indigestion, a drop or two of some essential oil will generally put a stop to them. Very often, too, we will find, upon inquiry, that they are always preceded by the reception into the stomach of some particular article of food, which in many cases will be found to be tea, particularly green tea.

To the disease, of which the principal phenomenon is painful action of the heart, the name of *angina pectoris* is given. The paroxysms of this disorder are generally in connection with organic disease of the heart, but they are not necessarily so. *Angina pectoris* is a very curious disease, every part of which is wrapt up in mystery. It comes on in paroxysms, generally when walking, particularly up a hill, and after having taken food. The patient is suddenly seized with a most painful and disagreeable sensation at the breast, about the heart; and he feels, that if he take another step he will die. There is no difficulty of breathing. He clings to the nearest support he can reach, and his face is pale, haggard, and indicative of the greatest distress. In the early paroxysms, these sensations soon pass away; but when the disease has attacked a person several times, they remain longer, and there is often pain felt in the shoulder and

arm of the left side. This is, however, by no means a symptom peculiar to angina pectoris. It is useless here to speculate upon its pathology. The best treatment for it seems to be stimulating liniments, and warm, carminative, or aperient medicines. John Hunter died of angina pectoris, brought on by a fit of passion.

We can easily understand, that when any obstruction is placed to the free passage of the blood through the various chambers of the heart, that palpitations and angina pectoris should be readily excited. Accordingly, we find that these, as well as preternatural hardness and irregularity of pulse, and also, in many cases, fits of syncope, are more frequent and dangerous when there is any disease of the valves of the heart or aorta, which either impede the transmission of the blood, or allow its regurgitation. To such, or to the organic diseases of the heart, we now turn our attention. We must, however, premise, that there exists a strong tendency in many people which makes them imagine, without the slightest reason, that they have got organic disease of the heart. The fact is, that in young and middle-aged people of a tolerably good constitution, organic disease of the heart, leaving out rheumatic fever, is a very rare disease indeed.

Many of these obstructions are dependent upon effusions of lymph from inflammation, particularly that following rheumatism. In other cases they are caused by the gradual deposition of granular, cartilaginous, or even bony matter, and in others by soft fungous growths. These latter changes take place slowly in persons of a bad habit of body, and usually in those past the middle of life, and are often perhaps dependent upon a morbid condition of the blood.

Generally these changes in the structure of the valves are followed, first by enlargement, and afterwards by hypertrophy of the heart, the existence of which is easily determined by finding its apex beating below the sixth rib, and by the impulse of this organ being greater. In addition, the natural sounds of the heart are altered. By comparing these with the state of the pulse, we can usually decide which valve is affected.

The progress of cases of diseased heart is very various. People suffering from them are always liable to die suddenly after exertion. In scarcely any can a cure be expected; but still, with care and attention, existence can be rendered, in many cases, very comfortable. The usual termination of them is, that the altered state of the circulation gives rise to other complaints, particularly in full-blooded subjects. But still it is to be observed, that the disease of the heart is merely the predisposing cause, and that the exciting causes, cold, intemperance, exertion, are such as can be avoided.

Of these complaints, the most frequent is perhaps bronchitis, and in those affected with organic disease of the heart it is scarcely ever entirely absent;

and in many cases this is combined with spasmodic fits of difficulty of breathing, or asthma. Such disease of the heart also predisposes to pneumonia, which, under these circumstances, is peculiarly dangerous. We can easily understand, too, that especially when the mitral valve is diseased, there will be often hemoptysis, or spitting of blood. In consequence, too, partly of the increased impetus of the blood when the left ventricles are hypertrophied, and partly from the congestion of the lungs obstructing the return of blood from the head, apoplexy, palsy, and epilepsy, to be afterwards considered, are often induced. From a similar reason, bleeding at the nose is common. The obstructed state of the circulation also often produces stagnation of blood in the liver, frequently followed by enlargement, and also, as we shall immediately see, to dropsies.

It is obvious that life is, in these different cases, threatened in very different manners. Sometimes we fear sudden death by syncope, sometimes by coma, and sometimes such changes are brought about in the lungs as threaten asphyxia. We, also, from the depressing effects of uneasy sensations, from the disordered states of the digestive and assimilative functions, in the cases where the liver is affected, see the whole system become weakened, disposed to suffer from the application of disease, and to sink under its effects.

Our plan of treatment must be entirely palliative, and directed to avoid these fatal consequences. The most important is a careful regimen, which avoids all sources of excitement, and the exciting causes of acute disease. We can often moderate the palpitations by foxglove and opium, and more rarely by prussic acid. Sometimes they become so violent as to demand bloodletting, which should always be as small as possible. As the uneasy sensations are always increased by flatulence, carminatives will often be useful.

Another disease of the organs of circulation, totally unconnected with inflammation, is hemorrhage. Hemorrhage is common from the mucous membranes of the nose, fauces, bronchi, stomach, bowels, &c., and occurs, but much more rarely, from the skin. In the same manner, blood is occasionally effused into the substance of the brain, and into that of the lungs. In the majority of these cases, there is no rupture of any vessel, but the disease is entirely one of exhalation. This has been very distinctly seen in hemorrhage of the skin, where a drop of blood is exhaled, wiped away, and another forms, and where we are certain there is no breach of continuity. In hemorrhage in the brain, however, there is almost always a vessel ruptured. The general cause of a hemorrhage is a local congestion of blood—very often depending upon organic disease. In the lungs, for instance, we have seen how common an attendant it is both upon tubercles in these organs and upon valvular diseases, particularly of the left side of the heart, inasmuch as, in this latter case, the flow of the blood through the lungs is much more impeded.

Blood effused into the substance of the brain almost always causes inflammation of the portion of that organ which surrounds it. Effused into the lungs, it is not so prone to do so, and is often absorbed.

The congestion of blood upon which the hemorrhage depends, may be either of an active or a passive character. We shall afterwards see that, in some cases, the nature of the blood itself is altered in such a manner as to make it more readily escape from its vessels.

From the different causes upon which the hemorrhage may depend, its treatment will in different cases be very various. When febrile symptoms indicate that the congestion is of an active nature, or when they tell us that the effused blood is exciting inflammation around it, bloodletting is called for, and is often followed by great relief. To this we add the rest of the antiphlogistic treatment; and if the bleeding part be within reach, a strong solution of alum, or the lunar caustic, is applied with benefit. When, however, the circulation is weak, we use internal astringents, of which perhaps the best is acetate of lead. Sulphuric acid and turpentine are also employed. Sometimes the circulation sinks so much, that stimulants are loudly called for; and frequently, after much loss of blood, that state of the system before alluded to, of prostration with excitement, comes on, and which demands full doses of wine, &c.

Another class of diseases dependent upon a disordered circulation in the capillaries constitutes the dropsies, the pathology of which will be easily understood. Dropsy is an effusion of the serum of the blood into the shut sacs, as the peritoneum and pericardium, or into the subcutaneous cellular tissue. Into these places serum is, as we before saw, in a healthy state continually exhaled, and as continually absorbed. If any cause diminishes the absorption while the exhalation goes on, of course the fluid gathers. And, in fact, this is the manner in which dropsies are formed. We have often had occasion to allude to the great physiological law, that plethora of veins diminishes the absorbent power of these vessels. Now, when there is some obstruction to the circulation, this fulness and stagnation of blood in the veins is induced, the absorption is less than natural, and we have a dropsy.

The internal parts which, when diseased, obstruct the circulation, and thus bring about dropsies, are generally the heart, the lungs, the liver, and the kidneys. The effects of organic diseases, or inflammatory effusions of the first three of these, in obstructing the circulation are obvious enough. When the kidneys are diseased—and commonly the disease is the granular degeneration before alluded to—no great vein or veins are obstructed; but the natural outlet of the serum of the blood is shut up, and in this case we probably have more of an increased exhalation than a deficient absorption.

In the disease called active dropsy, in which, after exposure to cold during perspiration, the perspiration is suddenly stopped, strong febrile symptoms set

in, and in a few hours the subcutaneous cellular tissue is filled with serum. There is another instance of dropsy being produced by excess of exhalation. In the disease called serous apoplexy, in which, after symptoms of active congestion, serum is effused into the ventricles of the brain, producing fatal coma, the disease is of a similar nature.

Dropsy of the peritoneum is called ascites, and of the subcutaneous cellular tissue anasarca. The diagnosis of these two dropsies is very easy. Dropsical effusion into the cavity of the chest, hydrothorax, and into the pericardium, hydropericardium, are not so readily distinguished from other diseases of these parts. Chronic hydrocephalus, too, is a dropsy.

There are many cases of partial dropsy, evidently dependent on an obstructed circulation in the veins leading from the part. This is particularly true of the lower extremities. And every one must have noticed the trifling anasarcaous swelling about the ankles, merely dependent upon a trifling and temporary debility of the circulation.

It is to be observed, however, that those organic affections which obstruct the circulation cannot be said to be more than strong predisposing causes of dropsy, inasmuch as they very often exist for a long time without any dropsical swelling appearing. Generally, some inflammation, often very slight, or some other cause disturbing the circulation, is the exciting cause. It is unnecessary to detail the various disturbing causes usually found in practice as efficient for such a purpose. We may remark, however, that the oftener the dropsy has appeared, the more readily is it again excited.

Dropsy is always injurious to the capillaries of the part, as is seen by the coldness of dropsical limbs, and still more by their tendency to go into a state of gangrene.

Dropsies may terminate fatally in a variety of ways. In ascites, the functions of the abdomen may be so deranged by the superincumbent pressure, and, in consequence, the proper assimilation of the food be so imperfectly performed, that death may take place in a manner similar to that by fasting. Dropsy in the chest may, and often does, produce asphyxia; and in all dropsies, effusion occasionally takes place upon the brain, and induces death by coma.

The great object in the treatment of dropsy is, to remove or lessen the cause obstructing the blood. This, however, is not often an easy task. As to the treatment of the dropsy itself, various methods are tried, and often successfully, to get rid of the fluid. One of these is the administration of strong or hydrogogue cathartics, as elaterium, croton oil, bitartrate of potash, and many others. This plan of treatment can, of course, be only used in patients whose general system is strong. Another, and generally speaking more preferable plan, is the exhibition of diuretics. Unfortunately their operation is never to be depended upon with certainty; but when their effect is produced upon the system, the

swelling, except in cases dependent upon renal diseases, very generally disappears. A great variety of diuretics are used. The most important are fox-glove, squills, many salts of potass, broom, juniper, saltpetre and calomel, nitric æther, &c., &c.

When, as often happens, there is much weakness, and we require to advise stimulants, we often make choice of Hollands, because this spirit, in addition to its stimulating effects, possesses also a diuretic property.

In inflammatory dropsy, we, of course, bleed; and in those dropsies which, although not of this nature, are attended by a firm pulse, moderate bloodletting, before administering diuretics, remarkably aids their absorption.

We also, by means of exercise, warm bathing, and sometimes diaphoretics, endeavour to promote perspiration. This plan of treatment is particularly called for in dropsy depending upon renal disease.

If, in ascites, the distention become very great, we employ the operation of tapping, and in anasarca sometimes we make little punctures, through which the fluid can ooze; but there is always some danger of these leading to sloughing.

It is a very mistaken notion that dropsical patients should not drink as much as they like. Drinking a moderate amount of fluid, so far from doing harm, is useful, as it often acts as, and assists the action of, diuretics.

CHAPTER XXIX.

CHRONIC DISEASES OF THE ORGANS OF DIGESTION AND ASSIMILATION.

In this chapter, we propose to treat, first of dyspepsia, then of chronic diseases of the liver, next of those of the intestines, and lastly, those of the general functions of assimilation.

1. Dyspepsia is a disease almost entirely the product of civilization, of very frequent occurrence, and productive of no small amount of suffering and inconvenience. It is a disease, too, which has, for many reasons, fallen into the hands of the quack; and its forms are so protean, and its duration often so obstinate, that even among the regular practitioners it has probably been treated too much by empirical rules.

The symptoms of dyspepsia are not uniform, but the following are those most frequently met with:—There is pain in the stomach, attended with a feeling of swelling and uneasiness; the pain is of a burning kind, and is known by the name of heartburn. There is great lassitude of the whole system, and

uneasy sensations are felt in various parts of the body. There is a tendency to eructations, which have a highly acid taste; and sometimes there is vomiting of half-digested matter, mixed with something evidently very sour. These symptoms generally come on about half an hour after the food has been taken. Sometimes, but rarely, they occur immediately after the reception of aliment. The tongue is often a little foul, and there is a bad taste in the mouth. This is particularly observed after awakening from sleep, especially if food has been taken just previously to going to sleep. Sometimes, but especially when the pains come on immediately after taking food, there is tenderness in the stomach upon pressure; but this is not a common occurrence in dyspepsia. After remaining an hour or more, these disagreeable feelings more or less abate. Generally speaking, they occur after the principal meal, especially if taken at an advanced part of the day.

Another form of dyspepsia is distinguished by the pain being of a more acute character, and almost always occurring in paroxysms. It occurs after having taken food, and in such cases is probably always accompanied with an excess of acidity in the stomach. But it also comes on when the stomach is empty, and is generally accompanied by the flow to the mouth of an insipid fluid—often in large quantities. This is called the water-brash.

These two forms of dyspepsia may occur every day, and in many instances do so. The third variety only comes on now and then, and is usually attributable to some decided error in diet. In it there is violent headache, loathing of food, vomiting—which, when the stomach is completely emptied, is of bile—with giddiness, and suffusions, as they are called, before the eyes. The old-fashioned name for this sick headache is a very good one—far better than one now often used, viz., bilious attack—because the only reason that the bile is vomited upon such an occasion is, that there is nothing else to be thrown up, and not that it is in excess. A sick headache rarely lasts more than a day.

All forms of dyspepsia are often attended with a peculiar state of mind, which dwells with ridiculous earnestness upon each aliment, attaches an exaggerated importance to the slightest uneasy feeling, and ever apprehends dangers. This state of hypochondriasis, as it is called, increases with indulgence, and often, indeed, imagines dyspepsia when none exists.

Often, too, with dyspepsia are joined—particularly in females—various affections, to be afterwards considered under the head of hysteria.

Sometimes these symptoms—or some extremely analogous to them—occur in connection with organic disease of the stomach. This organic disease consists sometimes of mere ulceration, sometimes of thickening, sometimes of the deposition of tubercular matter, scirrhus, or melanosis. Generally, in these disorders, there is frequent vomiting and great emaciation.

The exciting cause of dyspepsia is the reception into the stomach of some substance which that organ cannot readily digest. But the great predisposing cause, and the one which practically is the reason why the disease is so common, is the overstraining of the mental faculties consequent upon the unceasing struggle and anxiety of mind which so many of our redundant population have so often to undergo. Hence it is found in the harassed merchant, the struggling professional man, or the almost worn-out politician. The effect that mental anxiety has over the secretion and actions of the stomach, is remarkably exemplified in the fact before alluded to, of the digestion of the breakfast being easy enough, while after dinner, when in the meantime the labour of the mind has been going on, it is generally painful. Dyspepsia is undoubtedly promoted by irregularity in the hours of taking food, by want of rest after a meal, and by eating such kind of food as experience has shown to be difficult of digestion. Smoking tobacco, snuffing, eating potatoes, the daily use of tea or coffee, and many similar causes, have been, without any reason, put down as the causes of dyspepsia.

When the pain of the stomach comes on immediately after eating, and there is tenderness in the stomach upon pressure, we have every reason to believe that the disease is of a sub-acute inflammatory nature. But in the majority of cases, it appears to consist in an undue secretion of acid—probably, too, of a deteriorated nature—an undue secretion of gas, and a disordered state of the inner coat and muscular fibres of the stomach, of the nature of irritability dependent upon debility. What, then, is the proper plan of treatment?

When we suspect sub-acute inflammation, we make the diet as little stimulating as possible, restrict the patient to milk and farinaceous food, apply leeches, and afterwards blisters, to the stomach. Such cases are not, however, very common. In the ordinary forms, our first business is to relieve the distressing symptoms. That of acidity is generally cured by alkalies. Perhaps the most useful of these is the solution of potash, in doses of five-and-twenty drops, moderately diluted. There is this advantage, too, attending it, that its taste—and alkaline tastes are to many very disagreeable—is completely covered by the addition of a little sherry. Alkalies should never be taken after a meal, unless distinct feelings of acidity are present, inasmuch as we know, from physiology, that the gastric juice is acid; and when it is not in excess, any alkali would, of course, render a certain quantity unfit for its action upon the food. The flatulence is best relieved by a drop or two of essential oil, or a little brandy. When the pain is of the kind described under the second variety, it is still proper to administer an alkali, with which we may combine some antispasmodic. Should this not give relief, we must use sedatives. Of these, prussic acid is often highly serviceable, but, unfortunately, its action is very uncertain. The salts of morphia generally alleviate the pain,

and when it is urgent must be given. Hot fomentations are often serviceable. When the sickness is very troublesome, it is sometimes allayed by creosote, and sometimes by effervescing powders.

This variety of neuralgic pain sometimes distinctly intermits. When this is the case, we may confidently expect relief from quinine. When it does not, some preparation of steel is often very useful. In the other varieties, a great number of tonics are administered, the good effect of which is very doubtful. Quassia certainly has a sedative effect upon the stomach, and may very well be combined in the above instances with steel.

The organic diseases of the stomach are objects of palliative treatment only. We can generally alleviate the pain of them by means of the salts of morphia, henbane, and hemlock, and a course of iodine can do no harm.

The regimen is, however, the most important matter to attend to. First and foremost, a moderate but regular amount of exercise is absolutely necessary. By this the circulation in the limbs and skin is encouraged, and congestions of internal organs diminished, and, moreover, a general agreeable sensation is produced. The same ends may be, but more partially, obtained by bathing; and this should always be strictly enjoined in all cases where out-of-door exercise is impossible. By exercise, the mind is turned to the consideration of external objects, and thus, provided the patient be hypochondriacal, diverted from attending to internal uneasy sensations, and also in some measure from the cares and mental anxieties which provoke the disease. This is still better effected by occasional temporary changes of scene and habit. This may be daily done by gardening, or something of this kind, and by sojourning for a length of time on the seaside, or at a watering-place. In these cases, it is to the novel mental excitement, and the freedom from care, that the greater part of the amelioration is owing; and it is very doubtful if drinking the waters of these places has any beneficial effect, except upon the imagination.

With regard to the diet—as, from particular idiosyncrasy, many articles of food which agree well with one person excite severe dyspepsia in another—it is of great consequence that each individual should ascertain—and, of course, avoid—such substances as do not agree with him. As we have before seen, that the old notion of the only nutritious articles of food being such as contain nitrogen is a fallacy, due regard should be paid that the food contain those materials of which the system stands in need. In other words, the food must be a mixture of azotized and non-azotized substances. The times of taking food should be most regularly kept, and the quality should be about the same one day as another; that is, it is an improper thing to eat a good dinner one day, and a bad one the next. The digestion differs so much in rapidity in different individuals, that it is impossible to lay down any arbitrary rules as to how

long an interval should elapse between each meal. Great care should be taken to prevent the dyspeptic—if he has any tendency to hypochondriacism—from attending too much to his uneasy sensations, as so doing is infallibly certain to make them worse.

With regard to the nature of the food of a dyspeptic, the most contradictory opinions prevail. It is generally recommended to be of a very simple and non-stimulating nature. A cup of weak tea, dry toast made of stale bread, and a mutton chop, are advised for breakfast; a glass of sherry and another chop, with stale bread, for dinner; and a cup of coffee, with another piece of stale dry toast, is prescribed for tea. To this, some add a little sago gruel for supper. Of late years, however, there has been a strong tendency shown to depart from these rigorous regulations—regulations certainly very unwillingly attended to, and often entirely departed from. It may be doubted, too, if they are advantageous. In the first place, making a dyspeptic's food so very different from that of other people, tends to encourage hypochondriacal feelings, and, if such exist, wonderfully increases them. Then, it is difficult to make any patient uniformly observe it, and he has an occasional outbreak; and, as we observed, it is of great consequence that one day's description of diet should be like another's. In the next place, the constant use of the same articles of food, cooked in the same manner—particularly to a tender stomach—produces loathing; and the digestibility of any article of food is generally in the same ratio as the agreeableness of its taste. But, independently of these reasons, we doubt if such a spare and monotonous diet is at all advisable. The immense variety of the objects which nature has evidently intended for our food, and the many changes which cookery can produce upon such—and which, as was observed when treating of digestion, seem purposed to assist the digestive powers—seem to indicate that a mixed and varied diet is the one which is most natural; and universal custom has confirmed this opinion. We strongly suspect, that the best diet for the dyspeptic is that ordinarily used by those in his rank of life, merely avoiding those articles which he finds by experience most to disagree with him. As for wine and other stimulants, we will only observe, that dyspepsia is, as we have seen, usually a disease of debility, and that, in most cases, the moderate use of such is attended with relief to the annoying symptoms of the disorder.

The habitual use of purgatives probably tends to produce dyspepsia. Their frequent exhibition in habitual constipation, we shall have occasion to glance at when we make a few remarks upon that affection.

2. The two principal functional chronic diseases of the liver are cholera and jaundice. Cholera consists in an inordinate flow of bile, which brings on much vomiting of it, and also diarrhoea. It is attended by violent spasms in the bowels of an inflammatory nature, and also by cramps of the calves of the

legs; and it has a tendency to produce great exhaustion and debility. It is usually produced by heat, and occasionally by errors in diet. It is occasionally fatal—particularly in old and debilitated people—and the fatal event always takes place by the failure of the heart's action. The treatment consists in at first letting the patient almost alone, lest we check the discharge of morbid bile, and in merely relieving the pain by warm fomentations. Before the patient begins to grow feeble, we must administer opium in pretty full doses, which will generally check the disease. Occasionally, stimulants will be required, if much debility come on.

The peculiar yellow colour of the skin and eyes which characterizes jaundice, is caused by the presence of the matter of bile in the blood. This may be owing to the bile having been absorbed, or to its being retained in the blood and not secreted at all. It is absorbed sometimes apparently from its thickened state, which hinders its flow along the ducts. This occurs in people of a sedentary habit, particularly when such a mode of living succeeds a more active life. Upon other occasions, gall stones, or little calculi, are formed in the gall bladder, and these, becoming wedged in the ducts, hinder the flow of bile. These stones eventually pass on through the ducts into the duodenum, and give rise to extreme pain in so doing. This pain is felt at the pit of the stomach, comes in paroxysms, is not increased by pressure, and is usually accompanied with much vomiting. The treatment of these paroxysms consists in administering opium, and the use of the warm bath. The treatment of jaundice dependent upon absorbed bile consists in the administration of purgatives, and, generally speaking, it soon disappears. Jaundice from retained bile in the system is a very fatal disease. The retained excretion acts as a poison, and produces death by coma. The only known cause of retention of bile, is violent mental emotion.

We omit the chronic organic affections of the liver, which also often cause jaundice, as, however important to the practitioner, not possessing much interest to a popular student of the principles of medicine.

3. Of the non-febrile diseases of the intestines, the most common is diarrhoea. It consists in an increase of the secretions of the mucous coat of the bowels, or of those poured into the duodenum. It is more common in children than in adults; more frequent in hot than in cold weather; often clearly excited by ill-cooked, unripe, or otherwise improper food, and by getting the feet wet; and in children by the irritation of teething. In this latter case, it is, however, often of a sub-inflammatory nature. Lastly, it is often caused by organic disease. The treatment of simple diarrhoea consists—as the disease results from improper aliment, &c.—in, for a little time after the disorder has begun, doing nothing at all. Occasionally, it may be advisable to assist nature by the administration of a mild purgative. In a little time,

however, we can with benefit in most cases interfere; and we restrain its further progress by the administration of opium and astringents, particularly chalk, kino, or acetate of lead.

Colic is another chronic disease of the intestines. It is characterized by severe paroxysms of pain in the bowels; and in the height of the pain, the muscles of the abdomen are thrown into a state of cramp, and are often contorted, so as to form little knobs. Similar pains are felt in diarrhoea, but this disorder is always accompanied, and, in many instances, caused by temporary constipation. Its treatment consists in the administration of opium and purgatives.

A very prevalent disease in this country, and one which is the source of much uneasiness, is habitual constipation, with which no other disease is connected. This may sometimes depend upon the bile being insufficient to stimulate the intestines, or the nature of the food not being of a sufficiently stimulating quality, or too exclusively animal. In this latter case, however, the disorder would generally be of a temporary nature. It often occurs as one of the diseases incidental to old age, and in younger people it is induced by the pernicious habit of taking daily, or almost daily, colocynth, rhubarb, quack antibilious, or some other form of purgative pills. From being thus constantly stimulated, the bowels get into a most torpid state, and the general health always suffers, probably in a great measure, owing to the materials of which the pills are composed disordering the stomach. At any rate, those addicted to this habit have uniformly dyspeptic symptoms. We have found the following simple plan very effectual in curing constipation of many years' standing. In the constipation of old age, the bowels certainly do require a stimulant. A salt, phosphate of soda, if dissolved in soup made without common salt, cannot be distinguished in taste from soup as ordinarily served up. By prescribing a little of this every day to lunch, constipation has been prevented; the dose does not require increasing, and the stomach is not to the slightest degree disordered. In constipation in younger people, produced by swallowing pills, the immediate discontinuance of these drugs should be recommended, and no bad effect from so doing need be feared. A large draught, at least a tumbler of cold water, immediately upon getting out of bed in a morning, is generally effectual, and should be repeated for a few mornings, when the practice may be discontinued. Should this fail, a seidlitz powder, in a large quantity of tepid water, may be tried. In the most obstinate cases, the bowels, under this treatment, usually in two or three weeks become quite well.

Chronic organic diseases of the stomach are not easily, during life, to be distinguished from chronic inflammation in the same situation, and they are not otherwise interesting to a mere non-professional reader.

2. We pass on therefore to some chronic diseases of the function of assimilation, or of those diseases in which the assimilation of the constituents of the blood, and therefore the nature of its deposits and excretions, are much altered.

The first one of these which we will notice is scurvy. On a former occasion we had to allude to the ravages which this affection produced in our fleets, and it was stated that it was caused by the absence of fresh vegetables as an article of food. The symptoms of it are purple spots, often of great extent, underneath the skin; spongy gums, from which, as from the other mucous surfaces, blood often exudes. Hemorrhages, too, from wounds are often very considerable in amount, and difficult to stop. There is great emaciation and absorption, even of the callus which united broken bones, so that those who had fractures healed had the fracture back again. This has been known to happen when fifty years had elapsed after the fracture had united. There is great debility, and ultimately death by asthenia. It was always observed that depression of spirits greatly aggravated the disease. The treatment consists in a supply of fresh vegetables. Analogous to the sea-scurvy, which, however, occurs likewise on land, is the purpura.

A curious disease, which must be referred to this class, but which is fortunately unknown in this country, occurs in Switzerland and other places, where rye is a common article of food. It comes on when the rye is spurred, that is, when a little vegetable parasite grows upon the ear of the corn. Those who feed long upon this diseased rye are afflicted with general weakness, and a sense as if insects were creeping over the skin; then the extremities become cold and insensible; next excruciating pains are felt; and lastly, there is dry gangrene, and the fingers and toes drop off.

Rickets is another disease of this nature, in which the nutrition of the bones is interfered with. It is known by the large head, with the projecting brow, enlargements of the joints, and curvature of the legs when the erect position is assumed. In this affection, the bones are deficient in earthy matter, their texture less compact, and the contents of their cells are of a gelatinous nature. The general system is almost always affected, the muscles are flabby, the digestion impaired, and the mind precocious. Rickets is a disease of childhood and infancy, and its causes are the same as those producing scrofula. Fortunately, it is a good deal under the control of treatment, which must be of the tonic nature—nutritious food, good air and exercise, bathing, frictions, and such medicines as the state of the digestive organs requires.

This would be the proper place to treat of diabetes, calculi, &c.; but to understand such diseases, requires a minute acquaintance with chemistry, and we therefore omit them.

CHAPTER XXX.

CHRONIC DISEASES OF THE NERVOUS SYSTEM.

As may easily be imagined, the chronic diseases of the nervous system are very various in their nature and symptoms, and we can only pretend to allude to the more obvious and important of them. One important section of them, embracing apoplexy and its consequent palsy, is called the comatose, because coma is its leading feature. Apoplexy is a common cause of death. In 1852, eleven hundred and odd lost their lives by it in the metropolis. It occurs most frequently in those who have lived well, particularly if they have taken little exercise, and become corpulent. It is also one of those diseases, a hereditary predisposition to which is transmitted from one generation to another. Its pathology, however, essentially consists in a congestion or hemorrhage of blood in the brain. Hence disease of the heart, impeding the return of blood from the head, a short neck, any disease of the arteries, &c., strongly predispose to it. Very frequently some exciting cause, which has evidently disturbed the circulation, is observed previous to a seizure—muscular exertion, strong mental emotion, coughing, or exerting the voice, particularly if the breath be long held, and others of a similar nature. Moreover, cold, by depressing the circulation at the surface, is a powerful predisposing cause, and hence attacks of apoplexy are more frequent in winter than in summer. In London, in 1850, in the quarter ending the 2d of April, three hundred and seventy-six deaths from apoplexy are registered, while, in the one ending on the 2d of October, only two hundred and eighty-one. Suppressing an ulcer, or any discharge of long standing, by removing a congestion in a part remote from the brain, often disturbs the circulation there so much as to induce the disease in question.

An apoplectic attack sometimes depends upon mere congestion of the vessels—this form is denominated simple apoplexy; more frequently it is owing to hemorrhage, dependent, in the majority of cases, upon a rupture of blood-vessels—this is called sanguineous apoplexy; and there is a third kind, serous apoplexy, in which the morbid symptoms are owing to pressure upon the brain from effused serum; sometimes in consequence of congestion, or a state bordering upon inflammation, at others more resembling the effusion of a dropsy, and often in consequence of organic disease of the brain, which we can suppose disturbs the circulation in the same manner as that of the liver does the circulation of the abdomen.

Frequently the patient is warned of the danger in which he is, by several premonitory symptoms. Among these are transient confusion of ideas, flashes of light before the eyes, singing in the ears, occasionally double vision or passing blindness, difficulty of articulation, &c. If these be duly attended to, and proper lowering measures adopted, the attack of apoplexy may very frequently be avoided.

The symptoms of apoplexy vary much in different cases, particularly in intensity. Sometimes there is a transient loss of memory, with some slight local palsy; and in other instances the most perfect and profound coma, which often proves fatal in a few hours. This variety depends upon the difference both of the amount and the suddenness of the pressure.

In some instances—and in such there is probably always a sudden and copious effusion of blood upon the brain immediately after the commencement of the attack—the heart and circulation are affected, as we before saw, when done by a concussion, and a state approaching to syncope comes on. In these cases, at this stage, the loss of even a small quantity of blood would probably be immediately fatal. Hence the common notion of the propriety of bleeding in every case of apoplexy, is a mistaken and dangerous one.

In the majority of cases, however, the circulation shows no tendency to get into a state of syncope. The patient is suddenly attacked with insensibility, and falls to the ground in a state of coma. His pupil is contracted, his breathing laboured, his pulse firm but slow, and he can with difficulty be roused, or he cannot be roused at all. This state may end in recovery, or in death. When the former happily takes place, there is generally more or less of palsy, *i. e.*, loss of sensation or power of voluntary motion, or both, in some part of the body, frequently confined to one side, and upon the side opposite to that upon which the pressure in the brain has been made. In other cases, the memory or the intellect in general is weakened; and it has often been observed that emotions are often more readily excited in persons after an apoplectic attack, than they were in the same people before their illness. The powers of sense and voluntary motion are seldom, although sometimes they certainly are, thoroughly restored; but they are frequently much improved.

As may readily be supposed, from what we know of the physiology of the nervous system, palsy is, too, a frequent consequence of disease of the spinal cord.

The treatment of those predisposed to apoplexy is well understood. A light and spare diet, great moderation in wine, and in many cases total abstinence from it; little animal food, regular and early hours, and a very moderate allowance of sleep; much regular but moderate exercise, mental tranquillity, and avoiding the exposure to cold. The hair, also, should be kept cut close. To these we add, as derivatives from the brain, issues, and the frequent use of laxatives.

Whenever an attack is threatened, we still further reduce the diet, increase the quantity of purgative medicine, and employ bloodletting, particularly cupping.

When the attack has fairly come on—provided, as is generally the case, death is evidently threatened by coma—we use full and repeated bleedings, strong purgatives, giving the preference to croton oil, and cold applications to the head, while the feet and hands are kept warm. All these means are with a view to restrain the flow of blood to the injured part of the brain, and to check the inflammation which the effused blood excites. Should symptoms of syncope make their appearance, of course we use stimulants.

The treatment of the palsy should, for a considerable time, be confined to gentle friction and exercise of the affected limbs; and, after a time, when there is no chance of any inflammation remaining, we employ galvanism and strychnia; but the good effects of both these remedies are very uncertain.

It is important to remember, that cases every now and then happen which simulate apoplexy very accurately, but which depend upon debility and require stimulants. The correct diagnosis of these, demands sometimes the greatest acumen.

Another very important class of nervous diseases, is that composing those termed the spasmodic. These diseases, however, except in being nervous disorders, attended by spasm of the voluntary muscles, widely differ from one another.

We term a fit of general spasms attended by insensibility, a convulsion fit, when it evidently depends upon some known cause of irritation—as the irritation of teething, for instance; but when such takes place in an individual where such irritation cannot be traced, and particularly when it occurs very often, we call the case one of epilepsy.

Epilepsy presents itself in a great variety of forms, and in very various degrees of intensity. Sometimes it merely consists in a sudden but short suspension of consciousness, with a fixed gaze, and a tendency to fall upon the ground. But, in the idiopathic convulsion fits—to which the name of epilepsy is commonly given—the patient, apparently in the possession of the best health, suddenly utters a loud and terrifying cry, and then drops upon the ground in a state of insensibility. He is there most violently convulsed, and foam is poured out from his mouth. He generally continues for five or ten minutes in this alarming state, and then the foaming and convulsions cease, and he falls into a deep sleep, and when he awakes he resumes his ordinary appearance. The force with which the muscles are convulsed is very considerable, and occasionally the teeth are broken by being knocked against each other. Sometimes, indeed, the jaw-bone has been fractured. The tongue often gets severely bit, and in this case the froth from the mouth is bloody.

These fits vary very much as to the frequency of their occurrence. Sometimes many occur in a day, while at others, months elapse between two. Generally the memory is impaired after a succession of such convulsive attacks.

Besides the cry so frequently heard, as an admonitory sign of what is going to take place, two other very curious admonitory symptoms are pretty frequently present. One of these is called the epileptic aura. This is a sensation compared to a stream of air or water, or sometimes the creeping of a spider, which, beginning at some particular part, generally from a finger or toe, gradually comes up to the head, and when it has reached this part the seizure comes on. And what is very singular, sometimes, when the aura is just beginning, the fit may be prevented by tying a ligature between the part where the aura is felt and the head. What this aura is, or what, indeed, is the nature of epilepsy, is quite unknown. The other admonitory sign to which we allude is still more extraordinary. Before the paroxysm comes on, the patient is annoyed, sometimes by a disagreeable smell, sometimes by other uneasy sensations, and among the rest spectral illusions. A patient of Dr. Gregory, upon whose veracity the doctor could depend, assured him that, before each attack, he imagined that he saw a little old woman in a scarlet cloak, who struck him a blow upon the head, immediately upon which he fell into his fit.

The predisposing causes of epilepsy are, first and foremost, hereditary predisposition, and also a state of plethora and malformation of the skull, brain, or heart, or disease of any of these, and the peculiar state of the system we have before alluded to, and to which the name of mobility is given. The most important exciting causes are—excess of any kind, fear, or other strong mental excitement; intense heat, suppression of discharges from chronic skin diseases, the presence of worms, profuse hemorrhage, &c.

Epilepsy appears to be sometimes propagated by communication. On this origin of nervous diseases we shall presently have occasion to make a few remarks.

The treatment of epilepsy is not very satisfactory, and is principally an attempt to improve the general health. Sometimes the paroxysms demand bleeding, and other depleting treatment. If we can find a cause for the epilepsy—as the presence of worms, &c.—of course we attempt to remove such. Certain tonics are considered to have an effect upon the nervous system, and to be useful in such cases. Of these, the principal are lunar caustic, arsenic, valerian, and some salts of zinc and copper, but their use is often attended with disappointment.

Two frightful diseases of the nervous system, characterized by violent spasmodic action of the voluntary muscles, are tetanus, or lockjaw, as it is sometimes called, and hydrophobia.

Tetanus sometimes comes on after exposure to cold, but, in this country at

least, it almost invariably follows a wound, in which, in all probability, some portion of a nerve has been injured. The disease does not make its appearance until some days after the injury; and, in the interval, some important noxious change takes place in the nervous system. The first symptoms are generally violent cramps of the muscles of the neck, throat, and jaw, which soon extend to almost all the voluntary muscles of the body. When the cramp has once come on, the muscles never relax, but continue swelled in the centres; but they are subject to exacerbations every ten or fifteen minutes, giving rise to the most intolerable agony. During all this, the mental powers remain perfectly unaffected. The strength of the muscular contractions is sometimes so great as to break the thigh bones. When, as but too often happens, death ends the scene of suffering, it is from failure of the circulation, brought on partly by the inability to take sustenance, and partly by the exhausting nature of the pain.

Still more frightful, and still more certainly fatal, is hydrophobia. This disease, as is well known, results from the bite of a mad dog. Some poisonous matter is hereby introduced into the system, which, like other similar poisons, remains some time dormant before its dangerous effects are produced. In an individual bitten by a mad dog, the wound heals, and, in the majority of cases, the accident is forgotten. After a variable period—extending usually from six weeks to a year and a half—uneasy feelings are felt in the scar, and sometimes it breaks out again. Then the unfortunate man feels ill and uncomfortable; he is commonly extremely apprehensive and nervous, and often irritable; he feels pain and stiffness about his neck and throat; experiences a difficulty of swallowing, and attempts to do so bring on paroxysms of choking of a very distressing nature. This spasm of the muscles of the throat goes on increasing, and, at last, the patient, worn out, dies.

Dr. Watson has, with his usual felicity, described two cases of this disease, and we will offer no apology for abridging them. One of them occurred in a coachman, who had been slightly bit by a terrier. Ten weeks after, his hand, which was the bitten part, became painful, and the pain extended up his arm. He was in the habit of sponging his head and body every morning, but now he did not like to do it, on account of some unpleasant feeling about his throat. In a couple of days he felt very unwell, and observed that he could not swallow his medicines. On the day after, he entered the hospital, and we will give the remainder of the case in Dr. Watson's words:—"Water was offered him to drink, which he took and carried to his mouth, but drew his head from it with a convulsive shudder. After this, on the same morning, he was much questioned by several persons about the supposed cause of his illness, and water was again brought him, which agitated him, and he became exceedingly distressed and unquiet, complaining of the air which blew upon him.

"I first saw him myself soon after this. He was then, to all outward

appearance, well, lying on his back, without spasm, without anxiety, his face somewhat flushed. He said he had a little headache, but no pain in his arm. He appeared to be a very quiet, good-tempered man, and smiled generally when he was spoken to.

"I was naturally much interested in his case, and at nine in the evening I visited the patient again. He was composed and tranquil. Gruel was mentioned, and then he sighed two or three times deeply, then sat up, and, after a moment's look of serious terror, took half a spoonful of the gruel in a hurried, gasping manner, and said he would not take more at a time lest the *sensation* should come on. He was desired to drink the last portion of the gruel from the basin. He accordingly seized it with hurry, carried it to his mouth with an air of determination, and then a violent choking spasm of the muscles about the throat ensued. Most of the gruel was spilled over his chin, and he observed that he had been too much in a hurry, or he should have managed it. . . . He was quite rational and calm, except when attempting to take fluids.

"On the Wednesday at noon, he was nearly in the same state, but said that he was better. In the course of the night, some morsels of ice had been given him. With considerable effort, he swallowed two or three of them. The third or fourth caused so much spasm, however, that he was obliged to throw it out of his mouth; but, so great was his resolution, that he seized it again, and, by a strong exertion, succeeded in swallowing it. He complained now that his mouth was, and had been, clammy, and he champed much, and spat out a good deal of tough mucus. At his own request, and, as he said, that he might injure no one, a strait-waistcoat was brought, which he assisted in putting on. But he was perfectly tranquil then.

"I had now an opportunity of seeing him take some arrow-root. He sat up in bed to eat it, and, before attempting to do so, he made hurried inspirations and sobbings, precisely resembling those which occur when one wades gradually into cold water. He swallowed small quantities of arrow-root eight or nine times with hurry or difficulty, and with sighs that succeeded each other rapidly. He said that he felt the upper part of his throat narrower than it should be. . . . By the evening of that day, the disease had not made much further progress. He again sat up, and tried to eat some thinnish gruel. While taking the basin into his hand, he drew back his head to a distance from it, apparently involuntarily. He took one half spoonful with effort and distress, then sighed deeply and rapidly, or, rather, his breathing consisted of a succession of sighs at short intervals. He gave up the basin, and sank back on his pillow still sighing. . . . The next day he was still composed, though more easily irritated, and it was found that he had lost the power of moving the left arm, . . . and his mental powers were failing. He gradually

sank, and died in the evening, having repeated the Lord's prayer an hour previously. During the last hours of his life he had been moaning, and tossing from side to side. His lower extremities first became cold, and the coldness extended by degrees up to his chest. He hawked up, in the course of the day, a considerable quantity, and much frothy saliva came from his mouth towards the close. As his wife was wiping this away, his teeth—whether by convulsive action or otherwise—came in contact with her finger, and drew blood. The part was cut out, and no bad consequence followed that I know of."

Dr. Watson's second case occurred in a man about two months after he had been bit, and was attended with more disorder of the mental faculties, and notwithstanding that the presence of water was intolerable to him, yet he had no spasm about the throat. "The next day," says Dr. Watson, "I found the hospital in some confusion. Between eleven and twelve in the preceding night, some of the officers of the hospital had gone to his bed while he was apparently asleep, and certainly very quiet. They asked him if he would like some water. This seems to have greatly excited him, and, immediately after their departure, he rushed out of bed (terrified, he said), became furious, and was never again tranquil till he died, about the same time the next night. He was now put in a room by himself, and, taking advantage of the momentary absence of the nurse, he bolted himself in alone, and declared he would admit no person but her. The door was at length forced, and a strait-waistcoat put on him. He then became quieter in his manner, begged that no unnecessary violence might be used; asked to be poisoned, spat at some of the bystanders, and reproached them, talking rapidly and wildly like an insane person, yet loudly and angrily, imposing silence on every one who addressed him. He said he could not bear to hear any one speak; that he did not like my bass voice. Then he would sneer at the students, and say that they showed bravery enough now that he was confined; 'was it right for young gentlemen of education to stand there gazing with curiosity on a dying man;' asked for bread soaked in water, and, when it was held towards him, snatched it in his mouth in a savage manner; spoke of 'his poisoned tooth,' and talked perpetually. . . In the evening, I found his father with him. He had recognised him, and kissed his mother-in-law, but soon began to rave, and to be apparently occupied with absent persons. He was pale and weak, and lay with his head over the side of the bed, spitting continually upon the floor, which was thus made quite wet. He wished to have his hands at liberty, that he might 'clear his mouth.' He was soliloquizing when I went into the room in this way—'Monsters, monsters! See that monster! Susan, take her away.' 'I thought they would do much for science, but never supposed they would inflict such agony as this,' and so on.

"A little later, Mr. Arnott visited him. He had then no pulse at the wrist. The waistcoat was removed. He sat up, and used some water brought to wash his hands without apparent distress. Soon after he sank back exhausted, and expired."

It is a common opinion that madness is excited in a dog by hot weather; but canine madness is nearly as common in the other three quarters of the year as in the summer quarter, and it probably never occurs except in those cases where the dog has been previously bitten by a mad dog, or other rabid animal. The earliest symptoms of madness in a dog are, "sullenness, fidgetiness, continual shifting of posture, a steadfast gaze, indicative of suspicion, an earnest licking of some part on which a scar may generally be found." A depraved appetite is frequently observed; then the animal becomes irascible, flies at other dogs and at strangers, worries cats, destroys his bed; if beaten, he seizes the whip, and, if tied up, makes violent endeavours to escape, and tears his kennel to pieces.

There seems to be no great difficulty in altogether getting rid of this frightful disease. Mr. Torrens, who is a great authority upon hydrophobia, states his belief that, if every dog in the island were separately confined for a few months, the disease would be eradicated.

It seems probable that the popular opinion, that hydrophobia can be communicated by the saliva of a rabid man, is not correct.

When hydrophobia has attacked a man, it has proved uniformly fatal. Tetanic convulsions are sometimes cured. Various cases require various modifications of treatment; but, in general, our sheet-anchor is opium. Much, however, can be done to prevent hydrophobia from coming on in one who has been bit by a dog, known, or supposed, to be mad. The wounded part should be excised as soon as possible, as there is no doubt but that the poison lurks for some time about the wound; or, if this will not be submitted to, it must be well cauterized and washed.

Chorea, St. Vitus' dance, or "insanity of the muscles," as it has not unaptly been termed, is another disorder of the nervous system, in which spasmodic action of the voluntary muscles is the distinguishing feature. Fortunately, however, in its dangerous tendencies, it is remarkably opposed to the two diseases just alluded to. Indeed, in most cases, it is a funny disease. In it there are successions of little involuntary motions, particularly upon one side, which are increased by any definite movement. The leg of the worse side often feels exceedingly weak. It is essentially a disease of youth; and is more common in girls than in boys, in the proportion of three to one. It generally gets well in a few weeks. The treatment usually found necessary is a tonic one—preferring the chalybeate salts, alternated with purgatives.

There are a number of "awkward tricks," which are generally the result of

habit, but which sometimes probably depend upon some trivial disease of the nervous system, analogous to chorea. Of such are the twitching of the nose, corrugation of the brow, shaking of the head, and the like.

Catalepsy, or trance, about which such foolish tales have been told and believed, appears to belong to this class of nervous diseases, attended by spasm. In it the limbs retain that position in which they are placed, however contrary to gravity; and for a time sensibility and the mental powers are in abeyance. In ecstasy, a similar state, the mental powers are not dormant, but strongly impressed upon some one subject—generally of a religious nature. It is sometimes a part of an attack of religious insanity. Both diseases are of very short duration, and the victims of both are almost always hysterical women. It is a curious fact, which we owe to Dr. Copland, that the Italian improvisatori are in possession of their peculiar faculty only when they are in a state of ecstasy, in which the mind is exclusively occupied, not with some religious, but with some poetical excitement.

Another class of chronic nervous diseases is distinguished by the presence of disordered or painful sensation. To such the name of neuralgia is given. When it occurs in a nerve of the face, the disease is called *tic douloureux*. When in the head, we call the disorder *hemicrania*; and *angina pectoris*, *gastrodynia*, and *sciatica* are often of this nature; and very severe neuralgic pains attack the side and back, and are sometimes mistaken for inflammation. To another variety of neuralgia, the name of spinal irritation is given, and it is known by the pressure upon the back giving pain. It is not a disease of the spine, but a morbid sensibility of the cutaneous nerves.

In a great many of these cases the pain distinctly remits. Often an attack comes on once in the twenty-four hours. The pain is usually of a very severe character. Neuralgia generally occurs in nervous people, and almost always is associated with disorders of the system. Besides attempting to improve the general health, there are two tonics which are often very useful in these diseases—iron and arsenic; and when any intermission is perceptible, quinine.

To this class of nervous diseases must be referred the spectral illusions sometimes perceived by nervous people, when in their ordinary state of health; but more frequently seen in those under the influence of opium, or intoxicating drinks, and in those suffering from *delirium tremens*, a disease produced by excessive indulgence in spirits.

This seems the proper place for making a few remarks upon that most extraordinary disease, hysteria. Hysteria not only is a disease in itself, but it also simulates almost every other disease in the nosology; and many a time does the inexperienced or unwary practitioner imagine he has got to do with some dreadful affair, when nothing but hysteria is the matter. The hysterical

paroxysm has generally pretty distinctive marks, although even of it there are many forms. It is almost, but not exclusively, confined to women. It is usually excited by something which grieves or annoys the mind of the individual attacked. She is violently convulsed, but there is no distortion of the countenance, as in epilepsy; nor is there complete loss of intelligence. The patient feels an irresistible tendency to kick and knock about in the manner in which she does. Sometimes she attempts to tear her clothes, pull her hair, or to bite other people. She will often cease and remain quiet for a few seconds, and then commence again; but in this intermission she is often in a state of great agitation. The fit often ends in a flood of tears, deep sobbing, or convulsions of laughter, and often in a combination of the three. At other times, the convulsions are not so violent, but the patient sinks into a state resembling coma, from which she recovers in a depressed condition both of body and mind. In both cases there is often a sensation felt, as of a ball in the abdomen, which, appearing to rise to the throat, threatens suffocation.

The imitations of serious diseases which hysterical women sometimes have, and sometimes fancy they have, and sometimes pretend they have, are very numerous. The following is a curious instance of something of this kind:—A young woman was led into the ward of an hospital by her mother, and it required considerable skill to steer her clear of the bedsteads. She said that she was nearly, or entirely, blind. Her eyes appeared natural, the pupils contracted well enough, and the account the girl gave of herself was so extraordinary, that the physician began to suspect what was the matter. A pin happened to be lying upon the ground at a little distance. He very gravely asked her to pick it up; and she as gravely complied. This was an instance of hysterical blindness, and in this case it is probable that the girl deceived herself. Another case occurred in an hospital into which a patient was admitted who complained of perfect paralysis of both legs. She gave a very rational account of herself and her symptoms. She remained in the ward many months without any improvement, and without any restoration of the power of her limbs. So far from mending, she ran through many diseases. She had four or five of the chest, ever so many of the stomach, and, among others, dropsy. At last she was fairly detected hurting her nose to make it bleed, as she wished some blood to show, as at this time she alleged that she was suffering from spitting of blood. Upon this discovery, a stricter watch was kept over her, and one night she was seen to walk. This woman was in many respects an impostor, but we have no doubt that to a considerable extent she imposed upon herself. The following is a still more extraordinary case:—The wife of a merchant, whose disposition and habits were so extraordinary that her husband could not live with her, took it into her head to pretend to have violent fits of insanity. She

appeared to wish to excite great sympathy, and to make people believe that she was an ill-used woman; and she was always particularly careful to inform every one that her fits of nervousness, as she called them, were the result of her husband's hard conduct to her.

Another remarkable circumstance connected with hysteria, is its propagation by what may be called "moral contagion." If, in a large family of girls, one become hysterical, the others are almost sure to follow. And the same happens in a female ward upon the introduction of an hysterical patient. A stern nurse can, however, generally put a stop to it. This shows how much the disease is under the control of the will; but in some cases the patient really tries her utmost to suppress the disease, without success.

Hysteria, in its protean forms, and also the minor spasmodic diseases, are easily excited by mental emotions, and they are often very remarkably varied, according to the kind of mental emotion. Thus the manipulations of the professor of animal magnetism produce something like catalepsy, while some kinds of religious excitement produce jumping, and violent muscular contortions and spasmodic actions; and in all such cases, in accordance with what we saw from physiology, the emotions that are thus excited are remarkably increased by the presence of numbers.

The predisposition to hysteria is almost always given by a defective education, both mental and physical. The mind is too early forced, the body too little exercised; and young girls are often bred up to pretend to emotions which they do not feel, and to hide those which they do; and, in particular, a sort of luxurious delicacy of the powers of the mind is sought after at the expense of strength of intellect and of will.

The treatment of hysteria is, in a great measure, moral. Upon many occasions women, liable to hysterical fits, may be seen by strong acts of determination to resist going into them any more. The accompanying disorders of the system must, of course, be endeavoured to be got rid of. *Asafoetida* and many other medicines are recommended during the paroxysm; but, generally, all that is necessary is to hinder the patient from hurting herself. "A sudden and lavish" application of cold water, or the plunging the whole body into cold water, are certainly remarkably effectual in stopping the paroxysm, and when the disease threatens to spread in an hospital may sometimes be allowable; but this plan is not a remedy so much as a punishment, and it is scarcely justifiable, except in a case where we are sure that the disease is much given way to, and could easily be resisted.

We have only one more class of nervous diseases to consider. Unfortunately, it is one which embraces the most distressing disorders with which humanity can be afflicted. We allude to those in which the mental faculties are obscured and affected.

Madness consists in an alteration of the manner in which trains of thought follow each other, and of the intensity and duration of the attention fixed upon them. There is little doubt but that it always depends upon some change in the nervous system, although of the nature of this change we are entirely ignorant. When it occurs temporarily, and as symptomatic of febrile diseases, &c., it is called delirium.

There are several varieties of insanity, which any one walking through a lunatic asylum would easily perceive. Some of the patients will be found quite capable of conversing, and what they say, if not perfectly sane and sensible, is still intelligible and connected; others, again, will be found quite incapable of reasoning, and their whole conduct displays a want of purpose. Many of them are subject to great fits of violence, upon which occasions they become very boisterous and wild. Their minds are filled with all sorts of illusions, which inspire them with terror or rage. These fits of excitement are merely temporary, and, after a little time, the madmen relapse into their state of incoherence. These latter are said to labour under general madness. When the illusions are present, and the paroxysms of violence are witnessed, the disease is termed mania; and when, as often happens after the disease has lasted some time, there is total obliteration of the mental faculties, the term dementia is applied.

Of the former class of madmen—those who can reason, and who constitute about a half of those afflicted with insanity—there are two or three varieties. The madness of the whole of them is, indeed, more strikingly shown in their conduct than in their conversation. Their gesture and whole mode of existence is evidently different from that of sane people. Upon conversing with many of them, we find, although often with very considerable difficulty, that they labour under some grossly mistaken idea upon some one point. Perhaps they confound their own identity, or imagine that some part of their circumstances is very different from what it clearly is. Upon all other points they will be tolerably sane. Such are called monomaniacs. Another section will be found who, although generally different from sane people, yet are not subject to any decided mental illusion; but, upon examining their conduct and modes of thinking, we find that they are totally without all correct moral feeling, and that, on the contrary, all their moral feelings are perverted. This sub-class of madness—and an important sub-class it is—was first described by Dr. Pritchard, who has given it the name of moral madness. Another sub-class can be often observed, in which the leading feature is melancholy, and the delusions under which its victims labour are in harmony with this desponding feeling. They imagine themselves lost, damned, accused, and, perhaps, guilty of flagitious crimes. Their disorder is called melancholia. Another sub-class yet remains, and its votaries are apparently sane, but subject to occasional impulses, which drive them to commit horrible actions, such as suicide, murder, &c. This is

instinctive madness. These different forms of madness demand a few observations.

Attacks of mania seldom come on without precursory symptoms. The patient is generally observed to be restless and eccentric, and a degree of hurry may be observed in everything that he does. Notwithstanding, he performs nothing at all, and his energies are turned towards trifling and useless pursuits. He neglects his food, and spends sleepless nights—often rising from his bed to wander about in a state of uneasy perturbation. At length his reason becomes fairly disordered; he talks nonsense, repeats what he has said, stops in the middle of a sentence, becomes irritable, impatient of the most trifling opposition, obstinate and capricious, and expresses his opinions upon all subjects in an impetuous manner, and with a great deal of unnecessary warmth and enthusiasm. Next, he breaks out into some act of violence, and often shows that, upon some particular point or points, he entertains the most palpably absurd opinions. He is often aware that these opinions make him an object of suspicion, and exhibits great cunning in concealing them. The symptoms of madness by no means depend upon the natural disposition of the patient, but the timid are often bold, the bold timid, &c. To use the expression of Dr. Pritchard, many madmen appear as if possessed by an evil spirit, suggesting thoughts and feelings entirely foreign to their nature and habits. The paroxysms of madness sometimes arrive at a dreadful pitch of excitement: the unfortunate madman shrieks and roars, or rather bellows; thinks his best friends are his worst enemies, and abuses them in the most violent terms. He breaks everything that comes in his way, and tears his own clothes. When others are present, he will often be silent, or make a slight murmuring sound as if alone, but when alone he talks incessantly. Such lunatics cast from them with cries the food which is offered to them, and, notwithstanding this and the constant exertion both of body and mind, their muscular strength increases; and not only their strength, but their muscles appear to acquire an ingenuity and a pliancy which they had not before. Their wildness and boldness can, however, generally be checked by a bold eye and a firm voice. Sometimes, however, they cannot, and some kind of restraint is absolutely necessary. After their violence has expended itself, they become gloomy, and remain silent, or sing or talk without ceasing. These intervals alternate with the violent paroxysms. The upshot of all this is, fortunately, in many cases, recovery; in others, it subsides into a chronic state, in which there are still paroxysms of violence; and in others, it degenerates into dementia, which merely differs from idiocy, that in it the mental powers have been lost, while in the latter they never existed. The extreme cases of it are distinguished by the loss even of instincts; and the miserable victim sits in the same posture without desires, and without aversions, perhaps even ignorant that he lives. In

cases not quite so bad, the reason is altogether lost, and the demented person is the creature of habit and instinct. Some jump or walk round perpetually in a circle. Others run to and fro, mutter an unmeaning jargon, sit in silence with a constant smile, &c. Even in the worst cases, however, there is now and then a glimmering of reason, which faintly sparkles, and then goes out again.

Moral madness is also subject to fits of excitement. It is characterized by an absence of all reserve; those subject to it, talk to perfect strangers about their private affairs, and their feelings with regard to their friends and relations; they expose their inmost thoughts to all persons indifferently; they are, too, remarkably garrulous, relate long stories about themselves, and often show an astonishing accuracy of memory. They frequently attempt to explain the motives by means of which they allege they were actuated, and endeavour to prove that the most absurd of their actions were reasonable. A strong tendency to make extravagant purchases is also a very frequent symptom. But the most striking feature of the disease is a total disregard of veracity, and of moral obligation in general. Added to this, there is frequently an irresistible propensity to drinking intoxicating liquors to excess; and the state of excitement thus produced differs from that of ordinary drunkenness, in lasting for weeks or even months. The most absolute selfishness marks every part of their conduct, and their disregard for the feelings of others is perfect and profound. To these are to be added, a dislike towards relations and friends formerly beloved, and this dislike is very apt to shift from one person to another, and a proneness to suspicion.

In monomania, the particular object of illusion is generally of a selfish nature. Sometimes a monomaniac is merely crazy about the one prominent delusion, and perfectly sane upon any other subject; but, generally, the whole mental acts are weak and eccentric. The nature of the monomania depends upon the state of soul at the time. In times of strong religious feeling, the monomaniac goes mad upon witchcraft, hell, or magic; in the present age, which is, perhaps, distinguished from all preceding ones by its superior police, the monomaniac, in a great many cases, particularly among the poorer classes, raves about being pursued and threatened by the agents of this useful body. During seasons of strong political excitement, this excitement gives the tone to monomania. At the time when Napoleon erected so many new thrones, there were in France many monomaniacs who fancied themselves kings and queens, emperors and empresses.

The melancholy madman passes his time in solitude and idleness; is quiet, but inactive, and continually in apprehension; he fears to sleep, and when he does, his slumber is broken and disturbed. Such a lunatic is continually under the influence of depressing emotions.

Instinctive madness sometimes consists in an insane impulse, without any reason, to burn or otherwise destroy property; but, in other cases, the tendency

is to destroy life, and much more frequently to commit suicide than murder. Similar morbid propensities to steal have sometimes been met with.

Recoveries take place from madness much more frequently than is commonly supposed. When such a fortunate termination of the disease occurs, it generally comes on before the third year, but recoveries have taken place at much longer periods. Insane people never die of insanity, but of some other disease—sometimes, to be sure, of disease of the nervous system, which has induced insanity.*

There are no uniform morbid appearances found in the brain, or other parts of the nervous system, of those who have died while insane, and nothing is known of the nature of the change which, in all probability, takes place in the brain in this disease.

Perhaps the most effectual predisposing cause of insanity is either hereditary tendency, or an analogous state of the nervous system, brought on, in a great measure—at least in the majority of cases—by want of the exercise of the power of self-control, and by allowing our passions and our motives, even of the best and holiest kind, to become masters of us and our will, and not keeping them in perfect subjection to that will.

In those thus predisposed, from thirty to forty is perhaps the age in which an attack is most to be expected.

Of the exciting causes, the most important of a physical nature are, injuries of the brain, chronic diseases of that organ, drunkenness, and sometimes, perhaps, the suppression of evacuations and eruptions. Those of a moral nature are, long-continued poverty, sudden reverses of fortune, domestic calamities, in young people disappointment in love, and mistaken views regarding religion.

Madness, when, as we should have stated it often is, combined with various disordered states of the system, must be treated in accordance with the general principles to which we have so often alluded. The treatment of it as a disease, *per se*, is almost entirely moral. This depends upon the principle of removing, from the presence of the insane man, all objects which are calculated to foster his morbid feelings, and surrounding him with such objects and circumstances as will interest and please him, and thus promote that natural tendency, which we are to hope for, of the mind to return to a lucid state. Hence it is proper to remove the patient to an asylum; and it is also necessary that all violent means which would irritate and annoy him should be avoided, and that everything which can suggest pleasing trains of thought should be tried. To effect this, kindness on the part of all who have control over the lunatic, and the enjoyment of regular exercise and employment, with alternations of agreeable relaxation and amusement, will be found most useful.

* For some remarks upon insanity, in a legal point of view, see the close of the next Chapter.

We have now rapidly and imperfectly glanced at the leading principles of disease, and at the characteristic phenomena of the more important maladies which affect humanity. We have seen, too, the various modes in which they threaten life, and how many tend to a spontaneous cure; and we have further seen some of the principles, under the guidance of which we assist in averting the one, and in promoting the other. We have not learned how to treat disease in all cases, nor is it possible in a little time, and by reading a few books, to do so; but we have learned that medicine is not a mere thing of recipes, and that it can be practised with credit and success, neither by the uninstructed amateur, nor by the less reputable charlatan.

CHAPTER XXXI.

OUTLINES OF MEDICAL JURISPRUDENCE FOR POPULAR USE.

IN a country like this, every subject is liable to be called upon as a juryman, to decide upon cases in which reputation and life are often involved, which must be decided, at least in the main, upon medico-legal evidence. The most important branch of this subject is that which relates to poisons; and there is, in a subsequent portion of this work, a chapter specially dedicated to their consideration. Our object here is to present an outline of the present state of our knowledge upon the more important points of Medical Jurisprudence.

We begin with wounds. A wound is a violent injury of the surface; but counsel for prisoners accused of inflicting such are very apt to insist upon there being no wound, unless there is a distinct solution of continuity of the true skin. There is actually a case on record, in which a man who nearly killed another by striking him on the head with a bottle, destroying the sight of one eye, and the hearing of one ear, was found not guilty of legal wounding, because there was no evidence that any piece of the true skin was cut through. We suppose that, in such cases, a good deal depends upon the manner in which the indictment is drawn up.

When a dead person is found with wounds upon him, it often becomes a very important question—were these wounds inflicted during life or after death? If a wound be inflicted upon a party, say twelve hours before death, there is little difficulty in deciding, for inflammation (see Part II., Chap. VI.) will have been set up, the edges, &c., of the wound will be swollen, and serum and pus will have begun to be effused. When any of these are to be seen about the wound

of a dead man, then we may be sure that the wound was inflicted during life. In cases that require judicial investigation, however, it is seldom that a wounded man has survived his injuries for twelve hours.

A wound, however, if inflicted during life, even if it prove fatal in a few minutes, will generally be characterized by the edges, owing to the vital elasticity of the skin (see Part I., Chap. VII.), being somewhat everted by hemorrhage having clearly taken place, and of an arterial character, and by there being clots of blood, the last implying that the vital power of coagulation had been present in that fluid.

When, however, a wound is inflicted upon a dead body, particularly if it have been dead for some hours, the edges of the wound will be found close, not everted; there will probably be no bleeding at all, and if there be, it will be exclusively venous; and, above all, there will be no clots or marks of coagulation—blood that has been dead for a few minutes being, as stated in Part I., Chap. IV., quite incapable of going through that vital process.

Some of our readers may perhaps remember a horrible case that occurred some years since, and in which the jury had to decide upon this identical point. Greenacre was tried for murdering a female, and cutting her into several pieces—among the rest cutting off her head. The prisoner urged in his defence, that he did not kill the woman, but that he cut off her head after he found her dead. The muscles of the neck, however, were strongly contracted, and the hemorrhage had been so great, that there was no blood at all left in the head. Unquestionably the head had been severed from the body, either when the woman was alive, or *immediately* after her death—both of them conditions quite incompatible with the prisoner's account.

It is proper, however, to bear in mind, that a contused wound, in which there is no distinct cut inflicted during life, does not produce much bleeding. In instances of this kind, there is usually a discoloration of the adjacent skin, to which the name of ecchymosis is given, and regarding which very different questions have often to be decided upon by jurymen.

Sometimes the ecchymosis may actually appear, not exactly in the place where the injury was inflicted. An injury of the ankle, for instance, has been followed by ecchymosis of the knee. In general, however, the ecchymosis exactly corresponds to the extent of the part injured. Thus, in cases of hanging, there is usually an ecchymosed mark that exactly represents the course of the cord; in strangling, likewise, the marks of the fingers can usually in this manner be traced; and there is one curious case, in which an individual, to save himself, struck at his would-be assassin with a door-key, the only weapon he could get hold of. A man was taken up on suspicion, and the ecchymosis found upon his face exactly corresponded with the ward of the key, and it was by this circumstance that he was identified.

But it must never be forgotten that ecchymosis may be produced in a dead body, although, in such a case, there will only be extravasation of blood, and no marks of inflammatory action; and that in people, whose circulation has been very feeble before, ecchymosis may occur in dependent parts of their body when no violence has been used. Indeed, in some diseased states of the living body, the slightest pressure may produce analogous marks.

Farther, a very severe and fatal injury may be inflicted, and yet the surface upon which the blow fell have no ecchymosis at all. Thus a man was taken into a London hospital, having been run over by a large waggon. He died in thirty-six hours, his skin never having been discoloured; and yet, when his body was examined, all the ribs of one side were smashed, the kidney driven into the cavity of the lungs, and the right lung destroyed, all indicative of the extreme injury that he had sustained. In like manner, cannon balls often do great damage, although they make no outward mark. Formerly, such injuries were attributed to the wind of the ball.

Another very important question which a juryman has to find an answer to in his own mind, often is—how was the wound inflicted, and if by a weapon, by what kind of weapon? In the case of a cut or a stab, there can be no doubt but that a weapon has been employed. In the case of a cut, we regard the regularity of the wound, and infer from that the state of sharpness of the instrument that inflicted it. In stabs, one or both extremities of the wound will be cleanly cut, just as the weapon that inflicted it was single or double-edged.

It is very often alleged by counsel, that a wound may have been caused by a fall, &c., upon glass, and this may sometimes be the case. In general, however, a wound made by glass may be at once detected by the irregular nature of the orifice, and often by the presence of bits of glass in the wound.

A wound produced by any substance, to an ordinary man seems a wound, but the lawyers have sometimes made strange distinctions. Thus, the teeth, the hands and legs, have, in England, been pronounced not weapons, and injuries inflicted by them, such as biting off noses, not to come under the meaning of the act relating to wounds. At the Nottingham assizes in 1832, a man was tried for wounding, the weapon that he employed having been an artificial wooden arm. His counsel made a great effort to get him off, by pleading that this wooden arm had become, by long use, part of the body, and was entitled to be considered like a natural arm, as no weapon. However, he was not successful.

Another point that often requires to be decided regarding wounds is—whether they were accidentally inflicted, or the result of suicide or of homicide. We are guided in such cases partly by the situation of the wound. A suicide almost invariably selects the front and lateral sides of the body; the throat or

chest, if he use a cutting instrument ; and the region of the heart, the mouth, and the temples, if he employ fire-arms. Then a suicide, if he use a weapon, not a pistol, almost invariably makes an incised or punctured wound, rarely, if ever, a contused one. With regard to wounds in the throat that have produced death, it is probable, if the wound is very regular, that it has been the result of suicide, and not of homicide. This was one of the points strongly brought forward in the case of Sellis, servant to the late King of Hanover. But it is clear that this is a very fallacious criterion, and that a murderer, if he approach his victim unexpectedly, or if the murdered person be asleep, &c., can make a cut as regular, if not more so, than one bent upon self-destruction. In the case of Lord William Russell, the wounds were remarkably regular.

The direction of a wound will also sometimes assist in forming an opinion as to how it was inflicted. In suicidal wounds of the throat, for example, unless the unfortunate individual be left-handed, the direction of the cut is from left to right; while in a suicidal stab, the puncture is commonly from right to left, and from above downwards. A murderer may, and often does, make the wound in a part often selected for self-destruction, and in such cases the reverse of the above will generally be found to be the case.

Then, as a general rule, a suicide rarely inflicts more than one, or at most two, wounds upon his person ; while the murderer commonly attempts to make his wicked design certain, by making several. However, this rule, particularly in the case of confirmed lunatics, is not without many exceptions ; but when this is the case, only one wound is commonly mortal, and the remainder are comparatively trifling.

There are many other circumstances that assist us in forming an opinion as to whether a person found dead, lost his life from his own act, or that of another. Thus, if the weapon that has clearly inflicted the fatal injury be found firmly grasped in the hand of the dead man, we are sure that it was he that discharged the pistol, or used the razor, inasmuch as this firm grasp is owing to the muscular power of tonicity described in Part I. Chap. II. ; and the hand of a dead man made to encircle such a weapon, cannot be made to retain it in the same firm manner. Then, if the weapon cannot be discovered at all, the case has almost certainly been one of murder. There was, for example, the death of Lord William Russell. Courvoisier had the art to make the fatal cut in the throat in a manner very like what that unfortunate nobleman would have done had he destroyed himself, but he concealed the razor, and thereby made the police certain that murder had been committed.

The marks of blood in cases of fatal wounds will sometimes very materially assist us in forming our opinion. In the instance of a man found dead with a cut throat, it is always proper to examine if the blood have largely trickled down the chest. If it have, then most likely the wound has been inflicted

while the person has been in the recumbent position. Now, it is extremely rare for a suicide to cut his own throat when laid down. In the case of Lord William Russell, just mentioned, the throat had evidently been cut while the deceased was lying in his bed, and this was an additional reason for supposing that a murder had been committed.

Farther, in the case of a cut throat, we sometimes find the cravat, &c., also cut through, and in such an occurrence we have strong presumptive evidence of homicide.

Sometimes persons inflict wounds upon themselves for the purpose of making it apparent that a violent assault had been made upon them. These are generally so very mild in their nature, as to at once indicate their origin. One of the most extraordinary of these attempts, in modern times, is that made by Bolam, the banker, at Newcastle. This man was found in his office, which had been fired by himself or somebody else, beside the body of his clerk, Miller, who had been killed by having his skull beat in with a poker. Bolam, when discovered, either was, or pretended to be, in a state of insensibility; and his account was, that he had been suddenly attacked by a man, and knocked down by a blow upon the right temple; that he tried to escape, but was knocked down again; that a knife was held to his throat, and several blows given to his body; that he then became insensible, and remembered nothing more until he was found.

On farther inquiry, it appeared that his hands were not cut, and that he admitted that, when he felt the knife at his throat, he never raised his hands to protect it—in itself an improbable statement. Then his throat was wounded, but the wound was a mere short scratch. His waistcoat, shirt, and flannel-shirt, were severely lacerated, but his skin upon the corresponding bits was sound. There can be no doubt but that he inflicted the wounds upon his throat and clothes himself. As, however, no evidence was adduced showing that he had any motive for murdering Miller, the jury inclined to think that some quarrel had accidentally sprung up between the two parties, and returned a verdict of manslaughter.

It is important to bear in mind, that death may occur after a wound, and yet not be caused by it. Some very remarkable instances of this have happened. Thus, some years ago, in the United States, a man and his wife quarrelled, and the woman stabbed him three times—twice in the arm, and once again in the stomach. He died in ten minutes, and the woman was tried for murder—a crime of which she herself firmly believed that she was guilty. It was found, however, upon examining the dead body, that the wounds were not mortal, and that the deceased had, in fact, died from the bursting of an old aneurism of the aorta. Morgagni tells a similar tale of a man who was caught robbing an orchard. He attempted to escape, and the

proprietor struck him a slight blow upon the back. The old man ran a few yards, and then dropped down dead. There was no mark of violence upon his back, but, upon inspection, he, too, was found to have burst an aneurism of the aorta. Schoolboys and others who have suffered corporeal punishments and died soon afterwards, have, in like manner, often had their deaths, from carelessness, attributed to the wrong cause.

By the law of this country, death must occur within a year and a day after a wound has been inflicted, to bring home the crime of homicide to the aggressor. In such cases, however, counsel are almost certain to attempt to establish that the wounded man died from some other cause, as, for example, improper surgical treatment. And doubts upon this last-mentioned subject undoubtedly often prevent people from being criminally prosecuted. For example, a farmer in the north of Scotland was returning one afternoon from a hiring or "feeing" market. Another farmer, intoxicated, was riding furiously along the road, and rode right over him. The poor man was picked up insensible, and was pronounced by a passing medical man, who had also been at the market, quite dead. The supposed dead body was therefore taken to the church until the authorities could be communicated with. The following day, a medical man was sent to examine the body, and ascertain the cause of death. To his horror, he found the corpse quite warm, but he was unable to resuscitate it. In this case, it was impossible to decide whether death was the result of the accident, or of being laid out in the church all night, and the prosecution was dropped.

Very often, after very violent and fatal injuries, a person can walk a good way, or perform other motions. It is proper that jurymen should know this, and we may relate an instance or two. A father and son quarrelled together, and the latter threw a poker at the former with such force, that the weapon stuck fast in his head. Nevertheless, he called for those around him to pull it out, which they did with some difficulty, and then walked to the Infirmary, where he soon died. There is another case on record, in which a boy had the breech of a pistol, owing to the weapon bursting, driven right through his brain, and yet he lived and remained sensible for two days after the accident. It has often happened, too, that individuals who have received fatal wounds of the heart, have survived their infliction a considerable time.

Sometimes, also, after very dreadful wounds—such as, in the majority of cases, produce instantaneous death—acts of locomotion happen. Mr. Taylor relates the following illustration of this:—A man, walking along a London thoroughfare, cut his throat desperately, then put his handkerchief to the wound, and walked some yards before he dropped.

Many other difficult questions may arise in judicial inquiries relative to

wounds; but the above may, perhaps, suffice in a popular sketch of this nature. We may proceed to offer a few remarks upon burns.

It is very often of great importance to determine whether a burn found upon a dead body has been inflicted before or after death. If the burnt surface have blisters upon it, and, especially, if these blisters are filled with serum, we may be pretty confident that the injury has been inflicted during life. The reason of this is, that blistering and the effusion of serum are vital processes that cannot be imitated by dead matter. The only fallacy to this is, that after respiration and consciousness have ceased, in ordinary cases of death, the vitality does not entirely depart from the body for some little time. Hence the application of heat to a very recently dead, or, rather, to a dying body, may produce vesication. This has certainly taken place when the heat has been applied thirty minutes after apparent death; and the vesications have been observed to have been filled with serum also, when the heat has been applied within ten minutes of the supposed dissolution.

The above, however, is more particularly true when the heat has been inflicted by the application of boiling water. When the injury has been effected by red-hot solids, the disorganization may be so very great as to destroy the vesicles. But, in such cases, if the heated application has been made during life, there is almost always a deep red line of inflammation around the destroyed part. If, however, the heat has, for some purpose, been applied to a dead body, this will be wanting.

It is by no means uncommon for a murderer to apply fire to the dead body of his victim, for the purpose of making it appear that the deceased died from accidental burning. By attending to these marks, by ascertaining if the dead body have wounds upon it, and by looking if there have not been two burns on two different parts of the body, that could hardly have accidentally got on fire, this may generally be detected.

It is proper, however, to bear in mind, that the living human body can become so highly charged with carbon—generally from the combined effect of excessive drinking and want of exercise—that this carbon unites with the oxygen of the air, destroying the person, and gives origin to spontaneous combustion, as it is called.

In like manner, a good many dead substances, placed under certain conditions, spontaneously ignite; and it is well to remember this in investigating charges of incendiarism. It may here be proper to notice some of these. More than fifty years ago, a great number of fires occurred in the Russian navy, and also in the warehouses where marine stores were put. At first, these were thought to be the acts of incendiaries, but, upon inquiry, they were found to be owing to masses of hemp and flax, saturated with oil, being heaped together. It was found experimentally, by the Russian Academy of

Sciences, that these substances, placed under these conditions, were always liable to this spontaneous combustion. The great fire that took place in Plymouth dockyard, a few years ago, was partly supposed to have had an analogous origin.

Cotton soaked in oil, also, sometimes spontaneously inflames, and, indeed, even when this substance is saturated with water. The same thing occurs in the case of too green or imperfectly dried hay. Charcoal, too, particularly that form of it named *lamp-black*, seems liable to this spontaneous combustion; and of late it has been ascertained, that the variety of raw turpentine called *chip cake* is particularly prone to this strange decomposition.

Infanticide is, unfortunately, a charge that a juryman has often to investigate and decide upon. It means the murder of a recently-born child. In ancient and modern pagan countries, this custom is frequent and legal. In ancient Greece, children that were born deformed were put to death. The Roman law gave the power of life and death to parents, and it was not until the time of Constantine, and the general reception of Christianity, that child-murder was considered as a crime. At the present time, in China, a large number of the female infants are destroyed, and such is the case over almost the whole of Hindostan. But, perhaps, this abominable habit prevailed among the inhabitants of the Pacific Islands before they became Christians. Some of these, from this cause, became almost depopulated; and Mr. Ellis affirms that he does "not recollect having met with a female in the island, during the whole period of his residence there, who had been a mother while idolatry prevailed, who had not imbrued her hands in the blood of her own offspring."

In all Christian countries, infanticide is regarded as a most heinous crime, and the punishment for it in this country is the most extreme that the law uses. It is often, however, a point of the greatest difficulty to determine whether a child found dead has been murdered or not.

The first point which is usually of consequence to determine is, has the child ever been alive? that is, has it ever breathed? To decide this, the lungs are examined. These organs, in a child that never has breathed, are of a dark-purple colour—almost exactly resembling that of the liver; they are very small, occupying only a small portion of the cavity of the chest, in which they lie against the backbone; they have a firm feel, and their edges are sharply lobed. The lungs of a child, on the other hand, that has breathed, are of a florid red. They, along with the heart and great vessels, nearly fill the chest, and they approach the anterior wall of that cavity; they crepitate, or crackle, when pressed, and their edges are not sharp, but rounded off smoothly.

Then, as the air and blood, upon inspiration, enter the lungs, the former becomes so intimately diffused through the air-vessels that the lungs float in water.

Now, the lungs of a child that has never breathed will not float, but sink in that fluid; unless, indeed, as in some cases happens, putrefaction has caused them to be permeated with ammoniacal vapour. It is always well to remember, however, that a child's lungs may be so altered by disease as to sink; but in such cases, portions will always be found that will rise to the surface, whereas no single bit of a fresh lung that has never breathed will do so.

There are many other details connected with this subject, not quite suitable for a popular work, which we pass over.

Cases of *drowning* often require to be investigated by jurymen. When a person is immersed under water, death takes place purely by asphyxia. As before mentioned, unless the individual be in a state of syncope or nervous concussion from fear, striking his head against a stone, &c., supposing he be entirely immersed, asphyxia is produced in from one to two minutes. But if the person fall into the water in a state of insensibility, life may not become extinct for a much longer period.

Very often, perhaps in the majority of cases of drowning, sand, gravel, &c., will be found clutched in the hands of the dead man. This is owing to the natural tendency that any person falling into the water has to clutch and grasp at everything. A small quantity of water, too, is usually found in the stomach, although this is by no means uniformly the case. There is often a mucous froth about the lips and nostrils, and the surface is commonly very pallid.

The dead human body naturally sinks, but after putrefaction has begun, the ammoniacal gas that is exhaled into the intestines causes it to float. In this country, the time requisite to produce this state of matters is usually about five days.

Any body found in the water with gravel, &c., in its hands, a pale skin, and mucus about the mouth, and no other marks of violence about it, may be fairly presumed to have been drowned, and not thrown into the water after death.

If a body be found in water with wounds upon it, it becomes a question whether such wounds were inflicted before or after death. This must be settled according to the rules given above. But very serious injuries are sometimes inflicted upon people who are drowned, the moment that they fall into the water. This may happen from striking against a hard substance, or from the limbs being dislocated by striking against the water. This latter was the case in a remarkable instance. A man jumped from the parapet of London Bridge into the river for a wager. This he did with impunity; but, on repeating the experiment, sank and was drowned. On recovering his body, it was found that both shoulders were dislocated, owing, probably, to his having fallen with them in a horizontal position, instead of fixed closely to his sides.

Jurymen have likewise to consider cases of death by hanging. We abridge

Mr. Taylor's summary of our knowledge regarding this point of medical jurisprudence. By hanging is understood that mode of death caused by a ligature around the neck, pulled tight by the weight of the body suspended in the air. Death sometimes takes place entirely from asphyxia, and sometimes partly from coma, owing to the pressure upon the brain, caused by the flow of the blood to the heart being obstructed by the ligature. Very often both causes combine to produce the fatal result. Occasionally, but very rarely, the cervical vertebrae are dislocated. In such a case, death is instantaneous.

When a person has been hanged a short time, it is often possible to resuscitate him; but perhaps this cannot be done after the person has been suspended longer than five minutes. If a person in such a state be evidently suffering from asphyxia, cold affusions and ammonia should be employed; but if there be any comatose symptoms, venesection will be necessary. Almost all those who have been resuscitated after hanging, state that they have suffered little, and that they were not conscious of anything, save a ringing in the ears, and a flash of light before the eyes. After these, perfect stupor comes on.

The dead body of a man who has been hanged presents some characteristic appearances. The countenance is livid or occasionally pale, the eyes are prominent, the tongue is congested and frequently protruded, the lower jaw is retracted, the hands are clenched, patches of ecchymosis occur on the skin, there is a mark round the neck caused by the rope, but this is *not* invariably ecchymosed; but the parts underneath, the larynx, trachea, and the subsequent muscles, are depressed, and often lacerated.

Sometimes a juryman has to decide as to whether a dead body found hanging has died from the hanging, or whether he has been murdered, and then suspended in order to give the belief that he had committed suicide. This cannot be determined by inspection of the dead body, save so far as this, that if there has been a murder, marks of violence will in all probability be found upon the dead man. It must be borne in mind, however, that there are many cases of suicide in which a man first tries to kill himself by stabbing, &c., and not doing it effectually, then employs suspension.

Hanging may be the result of accident, and it is very probable that supposed cases of suicide are to be attributed to this cause. Sometimes this is evident; but it is believed that many of the instances in which boys have been found hanged, evidently on purpose, have in reality been the result of playing at hanging for amusement.

Hanging is also one, but a very rare, form of committing murder. Generally speaking, the murdered man in such a case has been very intoxicated, or insensible from being drugged. If these be not the case, there will be marks of violence upon the body, as the hanged man will have been sure to have made a stout resistance. One of the most extraordinary attempts to murder by

hanging occurred in Edinburgh. An old woman, nearly seventy years of age, took it into her head to hang her husband, who was some years older. She managed to twist a rope three times round his neck while he was asleep, and then hung him up to a beam. The neighbours went in and found him insensible, livid in the face, and his hands lying powerless at his side. They cut him down, and with great difficulty he was resuscitated. He said that he went to bed quite sober, and never remembered anything from going to sleep to being resuscitated. The probability, however, was, that both husband and wife were intoxicated.

The case, perhaps, that, of all others in which death took place from hanging, excited the greatest attention among medical jurists, was that of the Prince de Condé. As this involves almost every question that can arise regarding the subject, an abstract of it will not be here misplaced.

On the 28th of August, 1830, the Prince was found dead, suspended in his bedroom. A judicial inquiry was made into the event, the result of which was, that he had committed suicide. No farther attention was paid to the matter until his Highness' will was opened. It then appeared that he had left the whole of his immense estates to the Baroness de Feucheres, a lady who had long lived with him. His heirs disputed the validity of the will, and took the matter into the courts of law. There the great question became, had the Prince hanged himself, or, as the advocates of the natural heirs maintained, had he met with foul play, and been then suspended to give to the deed the appearance of suicide?

The following facts were given in evidence:—It was just after the French revolution that banished the elder branch of the Bourbons, and the Prince had been unusually desponding and disheartened. In his bedroom grate were found some torn pieces of paper, some of which, when put together, contained the sentences, "It is only left to me to die, in wishing prosperity to the French people and my country. Adieu, for ever;" followed by a request to be buried near the body of his son, the unfortunate Duc d'Enghien. He went to bed at his usual hour on the 27th of August; a bell was by his bedside, but no noise or disturbance was heard in his room.

At eight on the morning of the 28th, his man went to his bedroom door, but on receiving no answer to his knocks, became alarmed. The Baroness then went with him to the door, and on getting no reply to her very loud calling out, ordered the door to be broken open. This was done, and upon entering the room the Prince's body was found suspended from the fastening of the top of the window-sash by means of a handkerchief, attached to another that went right round his neck. The tongue protruded from his mouth, his fists were clenched, he was partially undressed, and his legs were uncovered, and moreover were bruised. There was a chair near the window, and the bed had been lain on.

Medical men were immediately summoned. They found the body cold and rigid, and considered that death must have occurred about midnight. There was a large mark around his neck, but no ecchymosis. Their decision was—1st, that the Prince had died from hanging; and 2d, that he had hanged himself. The excoriation of the legs they thought had proceeded from these members rubbing against the rail of the chair, from which they imagined he, after adjusting the handkerchief, had sprung.

The counsel for the heirs, however, contended that another view was much more probable. They maintained that assassins had smothered him—the one holding a pillow over his mouth, and the other holding him down by the legs, which had thus been injured; and that, after smothering him, they had hanged him up. To support this view, they contended that the Prince had not been unusually dispirited; that he had been heard to condemn suicide; that he had made an appointment for the following day; and that he had, on the evening previous to his death, wound up his watch, and made a memorandum of his losses at cards. They added, that the knots upon the handkerchief were so complicated, that so feeble an old man as the Prince was could not have tied them; and they insisted upon the fact, that the absence of ecchymosis around the neck proved that the ligature had been put round after he had been suffocated.

It was decided that the charge of murder was perfectly unfounded, and that there could be no doubt that the deceased died by hanging, and that he himself was the executioner. The assertion that there is an ecchymosed mark around the neck of a man hanged alive, although for a long time a received opinion, is, as we have before said, altogether an incorrect one. The making an appointment, winding up his watch, &c., do not in the least militate against self-destruction, and similar occurrences are extremely common in very many cases of suicide. Not only was there no evidence of assassination, but everything that really occurred militated against it. To use the words of Mr. Taylor—“Hanging is a very unusual form of committing murder, the individual, with the few exceptions mentioned, having it in his power to resist this description of violent death more than most other kinds. Now, although the deceased was old and infirm, yet we can scarcely conceive that his infirmities were so great as to render him wholly incapable of resisting the murderous attempts of these assassins; but, on the supposition that this was an act of murder, we must imagine that he did not offer any resistance, that he quietly walked across the room to be hanged; for we cannot but consider it clearly established by the evidence, not only that he died by hanging, but that he died where his body was found. We must further presume that, in moving from his bed, he neglected to ring a bell that was near his bedside, and which would have sufficed to have alarmed his attendants; that his assassins tied the handkerchiefs together by a very curious and intricate knot, which the deceased, from

infirmity, was incapable of tying; that they then adjusted his bed, and placed a chair by the side of his body, and left the room, drawing back the bolt on the outside by a spring, with which they had previously provided themselves; we are called upon to admit that all these proceedings were carried on without any noise or disturbance, by which some of the members of the household might have been alarmed."*

Strangulation without suspension is a mode of death that rarely comes under the notice of a jurymen. It was, however, the means employed by the burkers. Cases of death from asphyxia, however, in which the cause of the asphyxia is not external pressure, or cases of suffocation, are far from rare, and often require investigation. Practically speaking, these are almost always owing to breathing either carbonic acid or sulphuretted hydrogen gases. Each of these demands a passing notice.

Suffocation from inhaling carbonic acid is not uncommon in this country, and is still more frequent in some parts of the Continent, where it is a usual means of suicide. This gas is sent in large quantities into the air by combustion, breathing, and fermentation, by burning limestone, and is found in coal mines, and also in wells, and the like. When it is present in the air in very large quantities, and a person breathes such air, a sensation of weight is felt in the head; there is giddiness and singing in the ears, accompanied by a tendency to sleep; and so complete is the prostration of the strength of the muscular system, that the man, if standing, at once falls to the ground. The respiration becomes difficult, and at length ceases; so also does the circulation. The death takes place partly from asphyxia, but partly from coma, carbonic acid being a narcotic.

When the air is much less impregnated, but still contains a poisonous quantity, the symptoms are those of pure coma.

Where stoves are used, particularly when wood is the fuel employed, carbonic acid is apt, unless precautions are taken, to collect. Sometimes a coal fire, where the ventilation has been imperfect, has rendered the air poisonous. Deaths, too, occasionally take place from people sleeping near the fires of lime-kilns.

Individuals occasionally perish from inhaling sulphuretted hydrogen, proceeding from putrid animal matter. Such are scarcely cases of suffocation, as the gas appears to act pretty much as narcotic poison.

Lightning destroys, in Great Britain, more than twenty people annually. It kills by producing a violent concussion of the brain. Usually the body of a person so killed presents marks of contusion, or wounds, at the place where the electric fluid either entered or passed out. Sometimes the wound is a very considerable one, while at others there is extensive ecchymosis only. There is, perhaps, never a burn produced in the body by lightning, but it occasionally

* Taylor's Medical Jurisprudence, p. 541.

sets fire to the clothes, and thus the skin may be found blistered. Metal buttons, and other metallic substances in the pockets, &c., are sometimes fused. Although not uniformly the case, the blood in the body of one struck dead by lightning does not coagulate, neither do the muscles stiffen.

The last subject that requires our attention in this chapter, is the important question of insanity.

According to the legal definition of the word, insanity applies only to idiots, or to those who, having once had their reasoning faculties entire, have become subject to some delusion. Recently, medical men have recognized a form of insanity in which there is not delusion of the intellect, but perversion of the moral feelings. We will here consider the subject as it is usually treated of by jurists, and append, from the pen of a medical practitioner, an account of a case that appeared a well-marked one of moral insanity, as it has been named, which will, perhaps, give a better idea of the disease than any mere statement of symptoms.

Insanity is often said to occur in four forms—mania, monomania, demency, and idiotism. In the first of these, or mania, the derangement of the mental functions is pretty general; and there is great excitement of thought, and often of action. A patient so affected has hallucinations, *i. e.*, he fancies that he sees or hears things that have no real existence; and illusions, *i. e.*, he derives wrong ideas from the perception of real objects. But—and this is of the greatest importance—he fully believes in them both, and acts in accordance with such belief. Nevertheless, an observer would have great difficulty in discovering the connection between the illusions of the maniac and his acts, save by his own confession, which he is generally pretty ready to make.

In the second of these, or in monomania, the derangement of the mental faculties is partial. It is not, however, correct to say that the mind is sound save on one subject; on the contrary, the mind of the monomaniac is altogether unhinged, although one cannot always exactly define how; and the unsoundness manifests itself particularly with regard to some particular notion.

It is often of the greatest consequence, but, at the same time, extremely difficult, to distinguish between eccentricity and monomania; and the more so, that an eccentric man who is quite sane may depart more from ordinary modes of conduct than a decided monomaniac. The difference, however, is this—an eccentric man knows quite well that he is acting differently from other people, and absurdly enough, and he despises and laughs at the ordinary usages of society; but the monomaniac can never be persuaded that his acts are not consistent with reason, common sense, and common habits. Moreover, an eccentric man has generally been such all his life, while the monomaniac has commonly suddenly acquired his extraordinary habits or modes of thought.

The criminal responsibility of monomaniacs will be immediately noticed.

In the third form, or that of demency, the mental faculties are entirely destroyed, and memory and consciousness are altogether lost.

In the fourth and last form of insanity, there is congenital absence of the reasoning powers. Sometimes this absence is nearly or altogether complete; and such perfect idiots are characterized, likewise, by a very peculiar physiognomy, having no expression, but merely a vague look. In others, again, the mental powers are not altogether wanting; but a few ideas, although not sufficient to render them capable of the ordinary duties of life, may be acquired. Such are termed imbeciles. It is often almost impossible to decide as to whether a man is an imbecile or a fool.

Very nice questions often arise as to whether an insane person can be justifiably put under restraint or not. Formerly, lunatic asylums were intended not for the cure of the insane, but to prevent them from injuring the life and property of himself or of others. Now, almost all such institutions are designed to remove the malady of the inmate. But it is doubtful if it be lawful to restrain a lunatic for the mere purpose of curing him, although this is constantly done. According to the law, before a lunatic can be deprived of his liberty, he must be dangerous.

It is always, too, of great consequence to distinguish between violent fits of anger and insanity before submitting an individual to restraint. A passionate man has generally been always such, and has no delusion; an insane one has suddenly become what he is, and has delusions.

Independently of deciding as to whether a lunatic should be put under restraint, it is frequently necessary to decide as to whether he is to retain the management of his own affairs. Such cases must, in general, be decided by the rules of common sense; but it certainly frequently happens that ignorant people are sometimes declared to be insane, because they cannot answer questions which it is impossible they can answer. An amusing case of this kind occurred in Scotland. A very ignorant and foolish man was supposed to be unable to manage his money matters, and several medical men were sent to examine into his mental state. One of these asked him what money he had in the bank; and he replied, £1200, and that he got £20 for interest. How much, he continued, was that per cent.? The alleged imbecile could not tell. This the medical examiner gave to the jury as a proof of the man's want of judgment. And yet, when the counsel who appeared for the supposed imbecile put the question to himself, he could not answer it.

With regard to the criminal responsibility of a lunatic, the rule is, that no insane person is responsible like a sane one for any offence that he commits in a state of insanity. If he commit an offence against the law, he is not liable to be punished for the perpetration of that offence; but, as he is dangerous, he is liable to be submitted to restraint for the rest of his life. Hence, in criminal

courts, the plea of insanity is only made in cases of murder, in order to escape the extreme penalty of the law. Any person, however, subjected to restraint for murder committed during insanity, is entitled, if he recover and become sane, to be set free.

It may be proper here to state, that drunkenness is not any legal palliation for the commission of crime, and murder committed by an intoxicated person is held by the law to be murder.

It frequently happens that criminals feign insanity in order to procure a commutation of punishment, or an acquittal. Such, however, are generally easy of detection. A fictitious madman almost invariably overacts his part, and is always desirous of being thought insane, instead of, as is the case with a real lunatic, very anxious that such a notion should not be entertained. The form of insanity usually adopted by impostors is mania, but they can never keep up the violence day and night, as genuine maniacs do. Moreover, such always are most violent when they think they are watched. It is almost impossible to successfully feign monomania, demency, or idiocy.

Of late years, a form of insanity has been pretty generally admitted by medical men, in which there is no delusion or hallucination. We think we cannot do better than print the following essay upon the subject, communicated to us by a professional friend. In the painful case herein narrated, one or two little statements have been purposely, in order to prevent it being recognized, somewhat altered, but the general statement is strictly and literally correct.

MORAL INSANITY.

There has been more difficulty felt in defining insanity than any other disease in the Nosology. Medical men and lawyers have invariably differed about it; and there is, perhaps, no position so unpleasant to a medical practitioner as the witness-box in a case of doubtful madness. But even the individual writers upon medical jurisprudence, whether legal or medical, have usually a different definition of the morbid state of the mind in question. Speaking somewhat loosely, perhaps, it may be said that there are two forms of insanity. In the one, or idiocy, the reasoning powers are either dead or dormant, while, in insanity proper, they are imperfectly exercised; or, in other words, in this disease there are hallucinations, or illusions. A person so affected upon one or more ordinary topics, does not perceive and deduce as ordinary mortals do. A very considerable latitude is, however, allowed; and in single cases, it must often be matter of private opinion as to where eccentricity ends and madness begins.

In accordance with this view of the definition of insanity, it has been laid down by the most eminent legal authorities in this country, that illusion or hallucination is essential to mental derangement; and is, indeed, the only criterion of its existence. On the other hand, a very eminent physician,

and well known for his scientific acquirements and acuteness, Dr. Pritchard, has distinguished a new form of insanity, to which he has given the name of Moral Insanity, and in instances of which he maintains that there is no hallucination, at least not necessarily, so that the powers of the intellect are unimpaired, but that the affected individual is still not responsible for his actions. This opinion of Dr. Pritchard has been more or less adopted by many medical men, but has perhaps scarcely received from moralists and metaphysicians that degree of attention which it deserves. Our intention is not so much to pronounce our own individual opinion upon it, as to call the attention of such to it.

It is important to state, on the outset, that moral madness, as defined by Dr. Pritchard, is a distinct disease from what has been denominated insane impulse, instinctive madness, or *manie sans delire*, of the occasional occurrence of which there can be little doubt. One of the simplest cases of this form is the impulse, when looking into an abyss, to cast one's self into it. Some of the cases of attempted suicide by leaping from bridges, are perhaps more to be attributed to this cause than to the desire of self-destruction; inasmuch as, if a man wishes to drown himself, it is difficult to see why he fixes upon a high bridge to jump from, rather than the banks of a river. Many other instances of suicide, again, are rather to be attributed to this insane impulse, than to any other cause. We occasionally hear of, or meet with, still more painful cases, in which there are homicidal impulses. Mothers, occasionally, without any motive, destroy their children, or husbands their wives. Another form of instinctive madness, is an impulse, without any reason, to burn, or set fire to beds, houses, churches, &c. Propensity to steal is occasionally witnessed, undoubtedly dependent upon instinctive madness. Many cases of this kind have been recorded. One of the most striking is that of a young man whose natural disposition was perfectly honest and good. He received a wound upon his head which required trepanning, and ever afterwards was afflicted with this propensity to steal in question. In all these cases, however, it is very important to remark, that so far from there being any bad intention on the part of such patients, they struggle to prevent themselves from being guided by these impulses. The individual who feels the desire coming on him to injure himself or others ought to be secured; or the person who, so affected, steals, laments the turpitude of his actions, forewarns others of them, and desires whatever he takes to be returned.

In moral madness, however, as defined by those who recognize this form of insanity, the case is widely different. In all extreme instances of it, the patient's understanding is perfectly free from all illusion or erroneous conviction; but several symptoms, to which we will immediately particularly allude, manifest themselves, and his moral feelings and affections, and the sense of proper and improper, and of right and wrong, are perfectly obliterated. Nay,

more, the opposites to the usual tendencies are present ; the still small voice of conscience dictates deeds of evil ; pleasure is experienced, not on conferring benefits, but on inflicting pain ; kindness is met, not by gratitude, but by hatred ; and even the last bulwark of retiring virtue—shame, is lost. It is further stated, that these illusions of conscience, if we may use the expression, are as perfect and as independent of the person's control, as is the fancy of the ordinary lunatic, that his nose is a tea-kettle, or himself the Great Mogul.

The symptoms just alluded to, and which are usually grouped together in a case of moral madness, are numerous. There are fits of excitement, often of weeks' duration, frequently witnessed, which are said sometimes to resemble slight intoxication. The patient is unusually garrulous, and very anxious to talk about himself, and to make out his conduct to be very reasonable and correct, and there is usually surprising retentiveness of memory. Along with this garrulity is a perfect absence of that reserve and circumspection, which a well-regulated sane mind possesses. The patient talks to perfect strangers upon his most private affairs, and tells them his aversion, or strong attachment, as the case may be, to some friend or near relative ; and, in fact, is apparently anxious to expose his inmost thoughts to everybody. There is often a very strong propensity to make extravagant purchases of all descriptions. There is a total disregard of all moral obligations, and of veracity in particular. Not that the patient does not pretend to be guided in his conduct by morality or even religion—quite the contrary ; but, without any apparent cause, the most palpable falsehoods are told, and the meanest actions performed. There are fits of indulgence in excessive drinking ; and it is said that drunkenness induced in such patients is far more permanent in its effects than ordinary intoxication. In every action and thought, the most unbounded selfishness is evident, and the feelings of others are never taken into account. Relatives, formerly beloved, are hated ; and a proneness to suspicion is often very manifest, and apprehensions are entertained, or proposed to be entertained, for which there is no foundation, and which are deduced from very trifling circumstances.

Such is a brief outline of the symptoms which, according to Dr. Pritchard, constitute the disease of moral insanity, and in which disease the patient is said not to be responsible for his actions. In a great many cases of so-called moral insanity, we have no doubt but that, on minute investigation, hallucination could be detected. Indeed, the telling of improbable lies, which are sure of confutation, is in some sort an illusion, at least if they are intended to be believed. The explanation of this is, perhaps, that they, like many sane liars, are aware that an accusation of falsehood is not lightly or often made, and they trust to the person hearing simply disbelieving, without saying so much. In many other cases, we feel assured that the person supposed to be afflicted with madness, is perfectly responsible for his actions, which are nothing more or

less than wilful wickedness. But there is nothing improbable in the supposition, that as these unknown states of the nervous system obscure the intelligence, so do other obscure states of the nervous system deaden the perceptions of right and wrong. To this subject, too much attention can scarcely be directed. In place, however, of speculating upon its nature and diagnosis, we will content ourselves with narrating a case which fell under our own observation,* and which, in many respects, corresponds with the definitions of Dr. Pritchard.

At the time in question, we were in practice as a physician in a large city. One evening we received a message, desiring us to visit a Mrs. —, of whom we knew nothing. We found her in a comfortably furnished house, much alarmed at a burn which she had received in her face the previous night, owing to her cap having caught fire. The injury was not nearly so severe as she apprehended, and, as a surgeon was in attendance, we did not interfere. It appeared that she occupied part of a house, and the female who occupied the other part was in attendance upon her. This woman accompanied us to the door, and dropped an expression, from which we inferred that the accident of Mrs. — was in some degree dependent upon her own misconduct. The patient, at the same time that she had sent for us, had also sent for a clergyman, who was in the house when we arrived, and who, as our roads lay together, accompanied us homeward. We mentioned what the woman had hinted, and he replied that he had known Mrs. — for some time as a worthy and meritorious woman; that her domestic life had, he believed, been very unhappy, and that he did not believe the insinuation alluded to. A day or two after this we were spoken to by a previous patient, who it appeared had recommended Mrs. — to send for us. She stated that she had known Mrs. — from her girlhood; that she was a very worthy and respectable woman; that she had been very ill used by her husband, from whom she was separated; and, in answer to some inquiries, she added, that a degree of misconduct had, to extenuate his own errors, been attributed to her by her husband, but quite falsely; and that he compelled her to live under the surveillance of his own creatures, of whom the woman in the house in which Mrs. — lived was one.

We had pretty well forgotten the whole circumstance, when a few weeks afterwards we received another message from Mrs. —, stating that her burn was quite well, but that she was ill, and would like a visit, and that no one was in attendance upon her. We accordingly called upon her, and she begged that we would attend upon her, as she did not like the gentleman (the surgeon) in attendance previously, who, she added, had in the hurry of the accident been sent for, and that her usual medical adviser was a physician who was just dead. Mrs. — was a middle-aged, very respectable-looking woman. Everything about her person was extremely neat and tidy. So also was the apartment in

* That is, our informant's.—AUTHOR.

which she was sitting, with an approach almost to elegance in its arrangements. Over the mantel-piece was suspended the portrait of a gentleman. She was not exactly in her address what would be called a lady, but looked as if she had risen from a lower rank of life. Her manners, however, were mild, modest, gentle, and unassuming. She had the look of a person who had gone through a good deal of mental suffering. The disease of which she complained was a very perplexing one. At this time she had it in a very mild form, but afterwards she was much more violently affected. We may as well describe these more violent paroxysms. The main thing complained of, was violent pain, principally situated under the breastbone. This pain was so extreme, that she writhed about in bed, screamed out, and required to be held. She would go on doing this for several days and nights successively, with scarcely an interval. During these attacks she took no food or sustenance, except a little tea, and a small quantity of negus. She was often three or four days and nights without sleeping, but continually cried out and writhed, buried her face in the pillows, as if to stifle her groans, and begged to be held in case she rolled out of bed in her agony. All this time, however, she could answer questions with perfect distinctness and clearness of mind.

The first time we were consulted by her, she was not, however, in this violent state, but merely complained of a constant pain under her breastbone. We considered it to be of an hysterical nature. However—which is not usual in hysterical cases—the pulse was always firm and strong, and sometimes unnaturally so. She made a very excellent patient, obeyed every direction which was given to her, and never complained of the little progress she was making, although at the expiration of some weeks she was no better. Whenever we visited her, we found her employed in reading religious books, some of which were always placed upon her table. After some time we availed ourselves of an opportunity we had of consulting with a friend, one of the most distinguished physicians in the empire. He was inclined to believe that there was some inflammatory state present. Means to counteract such were adopted, but with no success. Then we returned to our former plan, and amongst other things prescribed *asafœtida*—partly, we must confess, from a suspicion that the pain was exaggerated. Our patient, however, seemed rather to like this drug, and would never afterwards remain without a bottle of it, some of which she frequently took. In time she became able to go about a little; and the only manner in which she disobeyed our orders was in persisting in going every Sunday to church half an hour before morning service began, and in remaining there until the afternoon service was over, although she frequently remarked that she was much worse upon Mondays. We happened once or twice to see her when out, and were somewhat surprised to notice the expensive manner in which she was dressed.

As she frequently desired our attendance, we became more intimate, and she sometimes hinted, but always with great propriety, and without complaining, that she had suffered, and did suffer, much sorrow, to which in a great measure she attributed her bad state of health. In time she told her whole history. She was, it appeared, the wife of an eminent scientific character, from whom she was separated. She stated that he was originally in the lower ranks of life, to which she also belonged. At an early age they married, and for years lived together exceedingly happy. She always spoke of her husband in terms of the strongest affection, and preserved every memorial of him she could obtain. The portrait we had noticed over the mantel-piece was his. As his merits became known, he advanced into higher social life, but his moral principles became laxer. He associated, she said, with intellectual but dissipated companions. He was much from home; neglected her, and was unkind to her; forbidding her to receive visits, go to church, &c. She then discovered that he had a mistress; then more than one; and at length he introduced one into the house, and ordered her, Mrs. —, to give up the keys and other insignia of housekeeping. All this time she acted as a submissive wife. He was next laid up with a fever, during which she nursed him with an attention and solicitude that produced an effect, and he became kinder. With returning health, however, his harshness was resumed. All this, she said, rendered her naturally unhappy, and she began to be affected by those pains and disordered constitution, of which she was now complaining. Finally, he insisted upon her leaving his house, and going to be boarded in a house in a remote part of the country. Almost heart-broken, she obeyed; and in this country-house endured much hardship and ill usage. A friend then interposed, and she was allowed to return to the town, and placed in the house where we first saw her—and which was certainly situated in a somewhat unhealthy district—and where, she said, the woman to whom it belonged treated her with disrespect, and rendered her uncomfortable. She was also, she told us, often much pinched by want of money, as her husband gave her a very small allowance, although he was in affluent circumstances.

One day she called upon us, and showed us a letter from her husband, which had accompanied some trifling present, and which was couched in kind terms. This put her apparently in high spirits, and her health became much better. It soon, however, relapsed into its former state; and, in despair, we recommended a change of locality, and she took a small house in another part of the town. This she made a perfect little bijou for neatness in its arrangements, and she settled herself and one servant in it. In a little time she dismissed the servant, who was, she stated, not honest; and she engaged an active young woman to come backwards and forwards to do her housework and attend upon her, but not to live in the house. Her determination, which was evidently very strong, to live alone, surprised us, as she had never manifested any such inclination before.

At this time she was much pressed for money, and she was advised to insist upon a larger allowance. She consulted a lawyer upon the subject, and by his intervention a very handsome quarterly sum, to be paid in advance, was settled upon her, and her debts, which were for a single woman somewhat heavy, were paid. By the time the second payment was due, she had again contrived to get into debt, and again she applied to her husband. He consented to pay what she owed, on condition that it was subtracted from her future payments, and he desired that, for some reason or other, the money should be paid to the tradespeople by us. She agreed to these conditions, mentioned the sum she wanted, which was sent to us, as we had yielded to the solicitation of both parties that this should be the case. We found the accounts remarkably heavy; and, moreover, she had understated them. We deeply regretted that we had consented to act in anything but a professional character for her; and to make matters better, the day after we had given her the receipts, she sent instructions to her lawyer to write to her husband, that she would not keep her agreement that the money should be subtracted from future payments, and that, if such were attempted, she would sue for a divorce. We intended remonstrating with her upon a bargain, into which we had been dragged, being so improperly broken, but she was in one of the paroxysms of pain, and we could only allude to it. She did not appear to see, however, that she had done wrong. Other occurrences were all this time taking place, to which it is necessary to allude. We may here remark, that the paroxysms of pain became much more violent and durable. She still made great efforts to go to church on Sundays, and employed herself in reading religious books. When confined to her bed, she always had some of them lying by her.

She at first expressed herself as much pleased with the woman who waited upon her, but after a time she dismissed her. She stated, as a reason for this step, that she had stolen some articles of dress, and that she had been horrified by discovering that she had two illegitimate children, the parent of whom were the young woman's own father. She said she did not like such a character to be about her. A remarkably intelligent and well-educated woman, whom we knew, then went to attend her. We desired this person to give us an accurate report of Mrs. —'s state. In a few weeks she told us that these violent paroxysms of pain did last without intermission, as Mrs. — said they did; that she had been constantly by her side in them; and that nothing had been taken in them except tea, a little negus, and the before-mentioned asafetida mixture. She added that Mrs. — appeared to be an exceedingly selfish woman; that she took a pleasure in giving trouble; and that she amused herself with keeping her (our informant), without any reason, without sleep for nights together. She said that Mrs. —'s vigilance in managing this was wonderful. She further added, that seeing her with religious books always in her

hand, she had spoken to her upon religious subjects, but that she did not appear to understand even the very elements of religion; and that, moreover, notwithstanding the books were always in her hands, she doubted very much if she could read, at least with sufficient fluency, so as to actually peruse the book.

This was startling, and we much regretted that this woman's going to be housekeeper in a lunatic asylum, prevented us from learning more from her. Her place was taken by another woman, who at first gave great satisfaction, but was afterwards accused of getting drunk, and going to sleep. The drunkenness she denied, but stated that, having been up two nights, she was ordered by Mrs. — to lie down, and a third person was, a few minutes afterwards, sent to look for her, as if her employer did not know what had become of her. A variety of attendants came after her, all of whom, according to Mrs. —, were guilty of some crime or other. She affected to make great efforts to obtain anything that had been her husband's, and at one time she met with a young woman who had once been housemaid in her establishment. She immediately engaged her, but soon afterwards stated to several persons that she had discovered the young woman was pregnant, and hinted that doubtless her husband had seduced her. This came to the ears of the girl, who was, apparently, an innocent and respectable person, and she was, with difficulty, prevented from instituting an action for the attempted injury to her character.

Whenever Mrs. — changed her servants, or when any other (to her) exciting occasion happened, she had a paroxysm of her pain, and to our great annoyance invariably sent for us. It is impossible to detail the various statements which she made upon these occasions. She was once in a most severe paroxysm, and stated that she had received a most cruel outrage from her husband, who had sent his mistress, who was in an advanced state of pregnancy, to insult her. She sent for her lawyer, and employed him to write to her husband about it. It turned out that Mrs. — had sent a message to her husband's housekeeper, desiring her to call upon her, and bring her some jelly. When the housekeeper came, she passed it off to a friend whom she had in readiness, as an unasked-for visit, and founded the accusation upon it. At another time she said her feelings had been wounded by seeing, from her bedroom window, her husband's carriage with his mistress in it. Now, the nearest carriage road to her house was at such a distance, that it was impossible to distinguish an individual, and scarcely a carriage. Further, she had never seen her husband's carriage, which was quite a new one. Upon another occasion, she accused a respectable man, who lived in the neighbourhood—and whom she had previously employed as a messenger with encomiums—of following her in the street, making faces at her. This statement was perfectly false, and we

now ascertained that the one about the woman with the illegitimate children, previously mentioned, was equally so.

By this time we were exceedingly weary of the trouble she was giving us, and tired of hearing her statements, and of being asked to execute commissions for her. For she was continually reminding us that she had no person in the world to do anything for her, and desiring us to write to her husband about her, saying how ill she was, and many other things of a similar nature, in the asking of which she had no limitation. We determined to wait upon the husband, who was, we may mention, an exceedingly intellectual, generous, and gentlemanly man, to state the condition she was in, and to inform him of her perpetually sending for us, and to demand instructions. We now heard his version of her history, which differed very widely from hers, and which was supported by various documents which he showed to us.

When a mere lad, this gentleman was learning an artisan's trade, and became acquainted with the present Mrs. —, then a very young woman, also earning her bread by labour. Unfortunately, with this girl he had an intrigue. She came to him, stated that she was *enceinte*, and begged him to save her reputation by marriage. With this request he complied, and soon found that the alleged motive was a falsehood, and that her real wish for the marriage was, that she was in debt, and knew that, if she married, her husband would become responsible for it. Accordingly, he was soon called upon to pay the amount. He endeavoured, however, to make the best of a bad job, and tried, but with little success, to teach her reading and writing. At intervals she had fits of drinking, particularly if she thought he was going to be from home. The propensity to make mischief soon manifested itself; and the gentleman showed us letters from lawyers, and lawyers' accounts which he had to pay, on account of accusations which she had made about people, and which were false. His pecuniary matters improved; but, with their improvement, he was annoyed by excessive and insensate acts of extravagance which she committed. Then, her conduct to him was intolerable. Sometimes, when he was, perhaps, miles from home, she would go to the back of the house, and scream out, to give the neighbours the impression that she was ill-used. If he was sitting reading, she would watch her opportunity, and dash the book out of his hands. If a friend was in the room, she would dart in and out of it, and, in fact, behaved in such a manner, that his acquaintances refused to frequent his house any longer. The gentleman stated, that, driven from home, he had become attached to a person, and that he had an illegitimate family. This state of things went on for many years, the pranks that she played being most extraordinary. At length, after a fit of excessive drinking, he was advised by her medical attendant to put her in a place where she could not procure liquor. This he did, and placed her in an institution—the like of which, although,

we suspect, illegal, are numerous—an asylum for drunkards. She had not been there long when she petitioned to be removed. He complied with her request, and settled an annual sum upon her, and she went to board herself in the house of her own relation, situated in the country. With this relation she soon quarrelled, and came to the house in the city where we saw her. He stated that the sum he originally allowed her was a small one, but that he made it so on purpose, from the firm conviction, that, whatever her income was, she would spend two or three times its amount. She was now, he said, exceedingly troublesome to him. He lived in constant apprehension of the slanders which she took a pleasure in uttering, and for which he was responsible; and she had every now and then an attack at him, on account of his illegitimate offspring, whose existence, however, she had only recently become acquainted with. He concluded by desiring us to continue in attendance upon her, and to endeavour to keep her, by means of our influence and surveillance, as quiet as possible. Anxious to investigate if she still drank, and desirous of understanding her mode of life, we placed an active woman to be her companion and attendant, with instructions to make reports of her conduct.

For some little time, this companion observed nothing more than the previous attendants had done. She had those fits of pain, during which she did not sleep for days and nights, but, as far as she could see, she took nothing but tea, asafoetida, and a little negus. She was, she stated, very selfish, and intentionally troublesome; she concocted slanders about people, told the woman her version of her history, and still held, for a long time together, religious books in her hand, but, in the belief of her companion, did not read them. At length, however, after much close watching, she observed her, in the course of one night, to drink two bottles of brandy. After each gulp of brandy, she took some asafoetida, which effectually prevented her breath smelling of spirits. The woman pounced upon her, and accused her of what she had done. Mrs. — was not in the least ashamed, but merely ordered her to tell no one. Mrs. — immediately began a series of plots, and very well-contrived ones, to injure this woman's character, with a view, doubtless, of making her word considered of less value. She, however, no longer concealed from her her habit of drinking, but took it openly. She would consume a dozen bottles of brandy in a week. Occasionally she varied it with vulgar liqueurs. When she lay awake in bed complaining of these paroxysms of pain, she was drinking. It is to be observed, that spirits, although taken in these excessive quantities, never made her stupid. Whenever she chose to give over drinking, she became perfectly quiet, got up, merely complained of the slight degree of pain, and amused herself with fabricating accusations against any one to whom she had taken a dislike, with spending money extravagantly, or with laying

up a stock of brandy. Acting upon the advice of another physician and ourselves, her husband determined to board her in a farm-house, where, although she would have her liberty, she could not easily procure supplies of liquor, and where she would have nobody but the farmer's family to tell her fabrications to. Even in this place, we heard that she contrived to obtain occasional supplies of spirits; and we have little doubt but that she is still subject to fits of drunkenness—that she still wastes money, still tells lies, still makes false accusations, and has not yet felt ashamed.

It is to be observed, that she did not herself believe the accusations she made against people. If she saw that anything was coming out which would disprove her tale, she immediately stopped it. Here, then, is a case which nearly corresponds to those described by Dr. Pritchard. And, certainly, no hallucination of any kind was present. Few, however, we think, will be of opinion that she did not require some restraint similar to that imposed upon lunatics who have illusions. How far she was accountable for her actions is a very nice question, which we leave to our readers. One thing appears clear, that for many of her tricks she had no motive except love of mischief; and the absence of all shame upon detection, coupled with a pretence to religion, appears to indicate a morbid state of mind.

Although somewhat foreign from our present subject, we may remark, that in ordinary insanity the moral feelings often remain quite perfect. We have more than once noticed this, and we may select one instance. We knew a simple-minded and very worthy yeoman, who had an unreasonable and unbounded confidence in our abilities. He had a son—a schoolmaster in the country. This young man went mad, and his father determined that he should come to his house to be “cured” by us. It was in vain that we recommended an asylum; the insane schoolmaster was to be our patient at any rate for a time. We may mention, that one of his eccentricities was, always wearing a top-coat which came down to his ankles. As might be expected, he got no better in his father's house, and at length the old man consented to send him to an asylum; and, ordering a coach, invited his son to have a ride in it, with the treacherous intention of taking him to such an institution. Immediately on being asked to get into the coach, the patient ran to his bedroom and bolted himself in. The father went to the door, and ordered him to open it and come forth. He obeyed, having been, perhaps, a minute in the room. On his return, he told his father that he was quite aware that he wished to take him to a place of confinement, but that he by no means agreed with him, and, on the contrary, was determined not to go. Indeed, he said a circumstance had occurred which would thoroughly prevent his leaving the house that day, and, unfolding his top-coat, he stood in the middle of the room a veritable *sans culotte*. When in his bedroom, he had pulled off his trowsers, and, along

with another pair, which constituted all his stock, concealed them. Search was ordered to be made for them; but he appeared quite easy on this head, and walked about the room, occasionally lifting up his top-coat to prove, that taking him from home that day would be a breach of all rules of propriety. The trowsers could not be found. The father then told him that he did wish him to go to an asylum; that it was necessary for him to do so; that he ought to obey him, and reminded him that hitherto he always had done so; and concluded by desiring him to reclothe himself, and go quietly into the coach. The poor fellow was sadly taken aback at this, and inquired if he might be allowed to consult the clergyman of the parish, who lived hard by. The clergyman came, and told him that he ought to obey his father; upon which he re-entered his bedroom, and soon appeared reclad, and with the spare pair upon his arm. He immediately set off to the asylum. Where the nether garments were hid was long a subject of speculation to his family, but is to this day a perfect mystery.

CHAPTER XXXII.

REMARKABLE EPIDEMICS.

ALL the contagious fevers become, from time to time, epidemic in this country; but there are two maladies that only occasionally prevail among us. One of these, on account of the excessive mortality that it produces, is called *the plague*; the other is the malignant or Asiatic cholera. Both of these require notice.

The mortality produced by the plague is fearful. In the fourteenth century it ravaged Europe, and, it is computed, destroyed twenty-five millions of people. This epidemic is the Black Death of mediæval writers. At the beginning of the last century, Marseilles was afflicted with a visitation of it, and, out of ninety thousand inhabitants, eighty thousand took the disease, and forty thousand died. The mortality at Moscow was even proportionately higher; and in the north of Africa, where it appears to be even more fatal, its ravages are almost incredible. Jackson mentions that he knew one village in Morocco, in which, out of a hundred and thirty-three inhabitants, a hundred died; and afterwards, travelling through that kingdom, he found whole districts almost depopulated. One had, before the epidemic, a population of between four and five hundred; of which eight individuals were left; and another, that mustered six hundred, had only

four souls left. It often happened that the survivors had not time to bury all the dead. Even in this country it has occasioned an excessive mortality, and in 1665, in London alone, sixty-eight thousand died from it.

The following table illustrates the disease as it occurred for five months in Smyrna in 1834. It shows some different classes are not only more liable to catch it than others, but that it is also much more fatal among them:—

	Population.	Cases.	Deaths.	Proportional Cases.	Proportional Deaths to Population.
Turks,	58,000	4,500	4,000	1 in 13	1 in 14
Jews,	8,000	457	297	1 in 18	1 in 27
Armenians, ...	6,000	120	54	1 in 50	1 in 111
Greeks,	48,000	600	450	1 in 80	1 in 106
Catholics,.....	10,000	50	30	1 in 200	1 in 333
	130,000	5,727	4,831	1 in 22	1 in 26

The plague is a very intense form of typhus, attended by extreme debility and an eruption of carbuncles. The great predisposing cause to it would seem to be debility; and here it prevails most among the very poor, who live in dirtiness and filth. It is not probable, however, that putrid emanations ever, as has been asserted, induce plague. Indeed, it appears certain that it is propagated by contagion. This view has been adopted by almost all European governments, and quarantine regulations have been framed. These have certainly, by some states, been abused, but there can be little doubt that they have prevented many epidemics of plague.

The word quarantine is derived from the Italian word *quaranta*, forty, because originally it occupied forty days. Men and animals are subjected to a probationary confinement, and goods and letters are subjected to a depuration. Each of these demands a little separate notice.

Putting men into quarantine is based upon the belief, that the poisonous matter of plague may be lurking in them, although, to all appearances, they are quite well. It becomes an important matter to settle how long an interval usually elapses between an individual being exposed to the contagion of plague, and the disease manifesting itself. It is now pretty generally believed, that if fifteen days have elapsed, there is no danger. Hence a vessel fifteen days from a port where plague was prevalent, is entitled to a clean bill of health.

The quarantine of animals would appear quite unnecessary, as there is no well-authenticated case of the disease having ever been introduced by them. Strangely enough, in the Levant, there is great fear entertained of cats in this respect.

In the Mediterranean ports, all goods are exposed to the air, and otherwise purified. This, too, would appear unnecessary, as plague has never been introduced into the lazarettoes, save by human beings or their clothing. That

the body and bed clothes can retain and communicate the infection seems undoubted.

Lazaretto is the name given to buildings appropriated as hospitals in many seaports in the Levant. A lazaretto is sometimes situated upon a little island; but if upon the mainland, the most perfect seclusion is secured. The servants of the place are kept in continual quarantine, but are well paid for their seclusion and the risk which they run.

Some of the smaller Italian states are accused of making quarantine laws for the purpose of hindering trade and of exacting fees. But at Malta, Marseilles, and Trieste, the only object sought to be gained is the prevention of the spreading of the plague, and this the quarantine regulations seem effectually to do.

The symptoms of plague are almost exactly analogous to those of very bad typhus fever; and the carbuncles, &c., that appear in it, would seem to be modifications of the petechiæ generally witnessed in that disorder here. In the East, like typhus fever, it commits its greatest ravages in the winter; but when it was epidemic in this country, it was observed to be most fatal in the autumn.

There is a variety of plague, perhaps only witnessed in very virulent epidemics, which is very analogous to the congestive form of typhus fever. In it the patient dies, in the first form of chilliness, before reaction has begun. This, we are told by Sydenham, was particularly common on the commencement of the great plague of London. Scarcely a day passed, he says, without people dying suddenly in the streets, having had no previous sickness, the purple spots of plague being found all over their bodies. When the epidemic fairly established itself, however, this was never witnessed, and none perished from plague unless a fever had preceded the dissolution.

The following table of some of the more important epidemics of plague may not be without interest:—

B. C. 1491, The Plague of Egypt. Exodus xii.			
1490,	"	in the Wilderness.	Numbers xi.
1190,	"	in the Grecian camp before Troy.	Homer's II., Book I.
1017,	"	in Canaan.	2 Sam. xxiv.
738,	"	of Rome.	Plutarch.
437,	"	Do.	Livy, Book IV.
430,	"	of Athens.	Thucydides.
182,	"	of Italy.	Livy.
A. D. 68,	"	of Rome.	Tacitus.
167,	"	of almost the whole known world.	
252,	"	Do.	Gibbon.
407,	"	Do.	
542—590,	"	Do.	
1345—1350,	"	Do.	
1562—1563,	"	of London.	
1600—1603,	"	Do.	
1655—1656,	"	of almost all Europe.	

A.D. 1663—1666, The Plague of England.

1720, " of Marseilles.

1743, " of Aleppo.

1770—1771, " of Moscow.

1799, " of the French army in Egypt.

It is now nearly two centuries since we have suffered from the plague in this country. We have, however, suffered more than once in this generation from another epidemic disease—the Asiatic or malignant cholera, which was nearly as fatal.

This malady originated in the delta of the Ganges, in the spring of 1817. In that same year it spread westward, moving regularly at the rate of about a degree a month. By the month of September it reached Calcutta, and two months afterwards attacked with great virulence the English army, then assembled on the banks of the Scinde. An offshoot of it also proceeded in the spring of 1818, from north to south along the Coromandel coast, and by October it had reached Madras. In the beginning of 1819 it invaded Ceylon, so that by this time the whole of Hindostan, including that island, were affected by it. From this, its original country, it has never departed, and every year it makes its appearance generally during the summer.

In 1819 it obtained a footing in Arracan, and thence to Siam and Malacca, and on the following year broke out at Canton. In 1823 we find it in Nankin and Peking, and afterwards in Chinese Tartary.

In 1821 it again began to resume (from India) its western route. In June of that year it appeared in the islands at the mouth of the Persian Gulf, whence it gradually extended itself to Syria. As winter came on, however, it disappeared, but only to return the following year, when it extended itself to Aleppo. With winter the disease again subsided. In the spring of 1823, it prevailed in the Syrian towns on the banks of the Mediterranean. At the same time that it broke out in the Persian Gulf, *i.e.* 1821, it found its way into the interior of Persia, and reached Ispahan. Next year it spread to the Caspian Sea, and in 1823 it reached Astrachan, situated on its north bank.

There then came a lull, but in 1830 it broke out in Moscow. It gradually travelled westward, and broke out in Sunderland in October, 1831, and the Lothians in January, 1832. It still went on in its western career, crossed the Atlantic, and broke out in America in June. "In this gradual diffusion over the civilized world," says Budd, "it has overcome obstacles that have hitherto been sufficient to stop the plague. It has traversed the Gaults and the Caucasus, the sandy deserts of Arabia and Persia, the Indian and Atlantic oceans. It has existed under the most various conditions of cultivation and soil, temperature and moisture; at the level of the sea, and in the region of Nepaul, at a height of not less than five thousand feet above it; on the borders of the ocean, and in the

centre of continents; during the summer heats of the torrid zone, and the rigours of a Russian winter; on the arid soils of Arabia and Persia, as well as in the marshy deltas of the Ganges and the Nile. It has made its way against the winds in Europe, and the monsoons in the Indian Ocean. It has desolated small villages and populous towns, the thinly inhabited provinces of the Russian Empire, as well as the densely populated district of Bengal. It has spared neither sex nor age. It has attacked the same individual twice or more, and persons affected with various diseases as well as those in robust health. It has numbered among its victims persons of all classes and almost of every nation."

There have been minor epidemics of this extraordinary disease since 1832 in this country, but nothing equal to that one in intensity. In India it is now a permanent cause of death, raging in different parts of that country almost every summer, and as malignant in its nature as it was at first. This is not the case with the British epidemics since 1832, the type of the disease in them having been very much milder.

Indeed, in this country, although malignant cholera was bad enough, it was never so frightfully fatal as in other countries. In 1832, about twenty thousand died of cholera in Great Britain, of which number five thousand were in London. In Jessore, ten thousand individuals were destroyed by it in the course of two months; and in India altogether, out of a population of forty millions, it is computed that, in thirteen years, the number of deaths from cholera have been eighteen millions. In Russia, sixty thousand died; and in Paris alone, eighteen thousand in the epidemic of 1832.

Although malignant cholera seemed sometimes contagious, yet its usual mode of spreading was not in this manner, and we must suppose some curious and morbid condition of the atmosphere. A plausible cause of it, but still not established, is assigned by Dr. Holland, who suggests that the course of cholera may be well represented by the propagation and migration of swarms of insects.

CHAPTER XXXIII.

HISTORY OF MEDICINE.

PAIN, accidents, disease, and death, are a part of the human constitution. That the three former of these can be sometimes relieved, and the period of the latter somewhat protracted, must have been perceived from the beginning. The first man must have knocked some part of his body against a hard substance, felt the pain thereby produced, and relieved it by rubbing. In this case the first man was the first physician. For long, however, the state of medicine was very rude and imperfect. Among the early Jews, its practice was confined to the priests, and consisted mainly in preventing contagious diseases by cleanliness and isolation, and in the administration of a few remedies of doubtful efficacy. The ancient Egyptians were acquainted with emetics and purgatives, but we may doubt of the success of the Egyptian practitioners, when we consider that there were physicians for every different part of the body, the eye, the head, the teeth, &c., all which implies the absence of any generalization. From Egypt the Greeks derived their medicine; and Esculapius attained such a celebrity as a physician, that after his death he was deified. His sons are said to have accompanied the Grecian army to the siege of Troy, where their practice was entirely surgical.

It is not strictly correct, however, to say that their practice was entirely surgical. All nations, in their passage from barbarism to civilization, pass through a state of fetishism; that is to say, through a state in which it is believed that supernatural powers exist, that these are of a malignant nature, and that they may be propitiated by charms and incantations. Such was the state of the sons of Esculapius, and a great part of their treatment seems to have consisted of such. Their descendants became the hereditary priests of the temples erected to Esculapius, and to which the sick resorted to receive advice, and probably for long also to have incantations employed to aid their recovery.

A new era began to arise. In the early ages of society, every man toiled with his own hands. As riches accumulated, a race of men arose who devoted themselves, not to bodily, but to mental labour—a race of philosophers. These, along with other branches of knowledge, studied medicine. At length one of the Esculapiades, who was also a philosopher, arose, and from the time of Hippocrates is usually dated the rise of rational and successful medicine.

Hippocrates was born at Cos, in the fifth century before the Christian era. He requires to be considered in two lights—in that of a physician, and in that of a teacher. As a physician, he has two great characteristics—the deduction of general principles from observation of numerous facts, and the power of accurately observing symptoms with a nicety that has perhaps never been equalled. It is remarkable, too, that his published writings contain the undeveloped germ of many of the most important discoveries of modern times—that, for instance, of auscultation, and perhaps of the circulation of the blood. As a teacher, he appears to have held what must in those days have seemed exaggerated ideas of the duties and responsibilities of a physician. He administered an oath to his pupils, in which they swore, among other things, to always use their art to the benefit of their patients, and never to their injury, even if requested by them; and that they would never reveal professional secrets.

Hippocrates is the undoubted founder of the school of regular practitioners of medicine. This is sometimes called the dogmatic school, because the practice is guided by general principles, or dogmata.

We should further state, that Hippocrates was a surgeon, as well as a physician; or what we would now call a general practitioner.

Subsequently, the Alexandrian school of medicine attained celebrity, and in it, in particular, was the subject of human anatomy carefully cultivated. New and more correct notions were in this way attained, particularly with regard to the anatomy, physiology, and pathology of the nervous system. But in this school there arose a new medical sect—the Empirics—a sect which has ever since contained a large number of medical men. They held that a knowledge of healthy structure, and of general principles with regard to healthy and diseased action, and the effect of remedies, was not only unnecessary, but beyond the powers of the human intellect; and they maintained that simple empirical experience should be the only guide to practice. The disputes between the Dogmatists and the Empirics were carried to a great length; the former, looking upon themselves as the regular practitioners, usually insisting that the latter were out of the pale of the profession. The appearance of a common enemy, however, made the two coalesce; and although no person ever does in reality practise without reference to reasoning, there have always been, and still are, members of the medical profession who are disposed to value isolated facts more than the generalization that may be drawn from them.

The cause, probably, of this union was the new sect of Methodus, or Methodists. Its founder was Themison, a physician, who probably practised at Rome, and who lived in the century preceding our era. He boldly maintained that medicine was independent of empirical rules, and also of general principles deduced from the observation of facts, and that it ought to depend upon some

preconceived idea, or *method*, from which latter word the sect derive their name. As every methodic may have his own method, the only bond of union among the members of the sect is their opposition to dogmatism and empiricism; and since the days of Themison, there have always been methodic practitioners of medicine, although their methods have been very various. Avowedly methodic practitioners, however, are not in general, and never have been, recognized as regular medical men by the profession.

The most eminent of the Roman physicians was Celsus, who flourished during the Augustan period. He is one of the representatives of the Rational or Dogmatic school. He appears, however, to have been a man of very independent mind, and to have rejected one or two of the dogmata of Hippocrates. The next medical writer of note, Galen, was, on the other hand, a most enthusiastic admirer of the father of medicine, as Hippocrates is sometimes called. This able and industrious writer, who has had an immense influence upon all succeeding practice, was born at Pergamos, A.D. 131, and subsequently settled in Rome, where he delivered lectures upon anatomy. For some reason—it is said the jealousy of his professional brethren—he was obliged, not only to discontinue these, but to leave Rome altogether.

The improvements made by Galen in the science and practice of medicine were many and important; but the great boon that he conferred upon his profession was his steady advocacy of the fundamental principle of dogmatic medicine, and the able general theory of medical science that he propounded. Increased knowledge has shown the imperfection, and sometimes the erroneousness, of some of his leading hypotheses; but there can be no doubt that his theories kept together the leading facts and principles of medicine during the long scientific darkness that was soon going to come on. Galen, we should add, rarely, and with reluctance, performed surgical operations.

From the death of Galen to the seventh century, medicine, at best, was stationary, and perhaps was retrograding. From the seventh to the tenth century it was assiduously cultivated by the Arabians. The Arabian school was essentially dogmatic, and its principles and practice were based upon those contained in the writings of Hippocrates and Galen, copies of whose works had been procured at the conquest of Alexandria. One of the most famous of the Arabian physicians was Rhazis, as he is commonly called, although his real name was Al Razi. From his youth he was a diligent student of science, but did not particularly direct his attention to medicine until he was forty years of age. Of his industry as a medical writer, some idea may be formed, when it is stated that he left behind him more than two hundred medical books. In these we find descriptions, for the first time, of measles and small-pox; and also we begin to perceive the application of chemistry to the *materia medica*, owing, probably, to the eager study of this science by the Arabians.

The following curious anecdote would indicate that the Arabian physicians did not perform surgical operations. Rhazis wrote a work on chemistry, which he took to Prince Almansour, who was so pleased with it that he gave its author nearly five hundred pounds, and wished to have the experiments contained in the book performed before him. Unluckily, as will sometimes happen, the experiments failed; and this so enraged the Prince that he called him a liar, struck him over the head, and bade him begone home. In consequence, it is said, of this blow, Rhazis became blind, and proposed having an operation performed; but when the *surgeon* came he refused to let him operate, because he could not tell how many membranes the eye contained.

After Rhazis came Avicenna, a still more famous Arabian physician. His oriental name was Ebn Sina. He was born in Bokhara, in the year 980. He was, from his childhood, remarkable for his assiduous pursuit of scientific knowledge; and at sixteen devoted himself to the study of medicine. He passed the remainder of his life in practising medicine—in drawing up voluminous medical works—and, which gives an idea of the dignity and status of a physician among the Arabians, in officiating as prime minister to more than one Mohammedan potentate. The most important of his works is entitled the *Kânûn*, and was early translated into Latin, in which form it had considerable influence over mediæval practice, not so much on account of any original merit that it possessed, as that it gave a clear account of the opinions of Hippocrates and Galen, whose works, in their original Greek, were unintelligible to almost every one at that period.

Arabian literature and science declined about the twelfth century. In Europe, from the breaking up of the Roman Empire to the fifteenth century, medicine was principally managed by monks, who followed, pretty implicitly, the dogmatic writers of antiquity. It would appear that these monks often performed operations, although they were constantly interdicted from doing so by the ecclesiastical authorities. It was, probably, their interdiction that gave rise to the establishment of a class of trades people, whose business it was to perform practical surgery. These invariably combined this with the occupation of a barber; and from this time to that of our grandfathers in this country, and in many parts of the continent to this day, a useful enough set of people devote themselves to surgery and shaving.

A great many of the mediæval monasteries had schools or colleges attached to them, but there is no probability that medicine was ever taught in them as a separate science or art. In the twelfth century, however, the medical school of Salerno was established; and during the next three hundred years, this was followed by many others. The result was, that the modern race of physicians was called into being; laymen, who had undergone a regular course of medical study, obtained, after examination, a degree, and who confined themselves to

prescribing for internal complaints, and to superintending the manual operations of the barber-surgeons.

In the fifteenth century, a variety of Methodism became very prevalent. It was founded by Paracelsus, one of the most extraordinary men that ever lived. He was such an inveterate liar, that it is not known what his real name was. He himself says it was Philippus Aureolus Theophrastus Paracelsus Bombast, the last of which titles has now attained a permanency in our language. His father was a medical man, and instructed him in medicine and alchemy, the latter of which seems to have attracted his attention. Paracelsus, however, was an idle student, and, at an early age, commenced a wandering life, travelling, in all probability, as a mountebank, through almost all parts of the then known world. By some means he became acquainted with a number of chemical remedies, or rather drugs, and the indiscriminate employment of these seems to have constituted his *method*. Somehow or other he got appointed, in 1526, professor of medicine in Basle. His first act here was to set fire to some sulphur in a chafing dish, and to put into the flames thereby produced, in the presence of his class, the works of Galen and Avicenna, exclaiming, "*Sic vos ardebitis in gehenna.*" He lectured in part in German; and this innovation, together with his new drugs, made him popular with the students; but in about a year he quarrelled with the magistrates, resigned his chair, and recommenced his wandering habits. Worn out by dissipation, he died prematurely; but there can be no doubt that he was the founder of a methodic sect that long existed, and that has again reappeared in our times, the members of which maintain that the laws of vitalized matter are the same as those of dead matter, or, in other words, that physiology is a branch of chemistry. Much useless mental labour was expended in this contest between the regular practitioners and the chemists, until the latter became at last extinct.

One of the great improvers of medicine that next appeared was Vesalius, who, believing that a knowledge of anatomy was essential to the successful study of physiology, carefully studied the structure of the human body. Our own Harvey followed, and with greater result, this example. This distinguished physiologist was born in Kent, in 1593, and after studying at Cambridge, proceeded to Padua, the university at that place being then a celebrated school of medicine. There he graduated, and returning home, began to practise in London. In 1628, he published his great discovery of the circulation of the blood; a doctrine that was violently opposed, and which, he says, materially diminished his practice. He lived, however, to see it universally recognized; and he became court physician, and at the head of his profession.

While Harvey and the physiologists were thus advancing the science of medicine, a number of practical physicians were adding to the facts ascertained with regard to pathology and therapeutics. One of the most celebrated of these

was Sydenham. This celebrated practitioner was born in 1624, graduated at Cambridge, settled in London, where he had a most extensive practice, and died in 1690. Hippocrates only excels him in his vivid and truthful descriptions of disease. A little after his time, the discoveries of Newton gave origin to a new sect of methodics. The members of this affected to believe that all the phenomena of the living body were under the control of, and could be explained by, the laws of mathematics. They were called iatro-mathematicians. This sect, however, had a very short existence.

The absurdities of this sect, and of the chemical physicians, were indirectly of use to dogmatic medicine. Hippocrates, and all succeeding regular teachers of medicine, had maintained that all vital phenomena were under the control of a peculiar principle. This, however, was somewhat vaguely termed *nature*. When such vital phenomena were referred to chemistry or mathematics, it became necessary to more clearly define the principle. Accordingly, Van Helmont maintained, that in all living bodies there was a principle of vitality, which effectually opposed all chemical and mechanical laws, and which presided over and controlled all the processes of the living body. This opinion, with developments, has been held by all succeeding dogmatic physicians, and, from more clearly defining the bounds of medical science, has greatly contributed to its advancement.

After the death of Van Helmont, the leading member of the profession was Boerhaave. This very accomplished man was born near Leyden, then rising into eminence as a medical school, in 1668. He was educated for the church, and early acquired an extensive knowledge of mathematics and of languages. On the death of his father, he supported himself by teaching the former, and studied medicine, for which he had a great attachment, at his leisure. He graduated at Hardewick in 1693, and commenced practice at Leyden. In 1701, he succeeded Drelincourt in the lectureship of the theory of medicine. He taught with such success, that two years afterwards he was offered the chair of medicine at Groningen. He preferred, however, remaining at Leyden. Here, in 1709, he obtained, in addition to his previous chair, that of medicine and botany. About this time, too, he published his "Institutions," a book that will ever remain a model of a comprehensive, erudite, and philosophical system of the principles of medicine. Six years later he received the chair of practical medicine, and some time afterwards that of chemistry. All these subjects he taught with equal success, and raised the university of Leyden to the very highest rank as a medical school. No physician, perhaps, had ever so extensive a practice; and not only did crowds flock to him for advice, but his management, by letter, of disease was carried on on an extensive scale. He was regarded by his fellow-citizens as one of the greatest of the inhabitants of Holland; and when he recovered from a dangerous illness, the whole town

signified their joy by an illumination. He died, in 1738, full of years, of wealth, and of reputation.

It was during the eighteenth century that the physician attained his highest social rank and standing. The science of medicine had attained so extended a range, that the medical man could now feel that he could exercise a useful profession; and the physicians who practised it were men who had enjoyed a university education, and who practised it as a profession, and had nothing to do with selling drugs or rendering accounts. But there gradually rose up the class of apothecaries, who depended for a livelihood upon the sale of the drugs that they sent out to those who consulted them. These have, save in large towns in this country, almost annihilated the class of physicians. Such, however, are now themselves becoming physicians, and destined, probably, in their turn, to be destroyed by their present prototypes, the druggists.

Two of the most eminent of Boerhaave's pupils were Van Swieten and Haller; of these, the former mainly contented himself with expanding and popularizing his teacher's views, while the latter was a man of most original mind. Indeed, medicine scarcely owes more to any one individual than it does to Albert von Haller. On this account, and by reason of his extraordinary industry, his life deserves here a passing notice.

Albert von Haller was born at Berne, in the year 1708, of an old and respectable family. His childhood was precocious; and when very young, he drew up a biographical dictionary, compiled a Chaldee grammar, and wrote Latin verses with facility. He was intended for the church, but his natural bent for the study of medicine was so strong, that he was allowed to study it at Leyden. Here he attended the classes of Boerhaave, and ultimately graduated. Not long afterwards he was appointed professor of medicine, anatomy, and surgery, at Gottingen. This post he held for eighteen years, refusing all practice, and devoting himself solely to science. At the expiration of this period he resigned his chair, and spent the remainder of his days at his native city, busily employed with science and literature. He died in 1777.

It is impossible to overrate the value of the labours of Haller. Indeed, the present satisfactory state of physiology is mainly attributable to him. It was he who clearly discriminated and defined the two vital powers of contractility and irritability, as described in Part I., Chap. II. His minor additions to the science are too numerous to be here noticed. He was, perhaps, the most voluminous medical writer that ever lived; and when we consider the value of these writings, their learning and accuracy, and couple them with the fact, that he was likewise extensively employed as a magistrate, his published works become marvellous.

A contemporary of Haller, and a strenuous advocate of dogmatic medicine, existed in Cullen. He was born in Lanarkshire in 1712. His parents were in

poor circumstances, and unable to afford him a university education. He served an apprenticeship to an apothecary in Glasgow, on the expiration of which, he became surgeon to a merchant-ship that sailed between London and the West Indies. He seems, however, to have soon tired of this post, and he settled as a country practitioner in the parish of Shotts. Accident introduced him to the Duke of Argyll, when on a visit to a neighbouring gentleman, and Cullen succeeded in making a favourable impression upon him. He then removed to Hamilton, where he was equally successful with the Duke of Hamilton, by whose influence he was appointed, in 1746, lecturer on chemistry in the University of Glasgow, in which place he then graduated. He here rose into distinction, obtained a large practice, and five years later became professor of the practice of medicine.

In 1756, Dr. Plummer, the professor of chemistry in the University of Edinburgh, died, and Cullen was appointed to succeed him. He also delivered clinical lectures in the Infirmary. In 1763, Alston, the professor of "*Materia Medica*," died, and Cullen obtained his chair; and so great was his popularity, that he raised the class from eight, to more than a hundred students. He afterwards obtained the chair of institutes, and eventually of the practice, of medicine, and was one of the main causes of the University of Edinburgh attaining her great eminence as a school of medicine. Cullen died in 1790.

Cullen was a firm dogmatist, and his authority among the regular practitioners is still extensive. It is unnecessary here to give any peculiar views that he may have held regarding the humoral pathology. As a writer, he is remarkably clear and exact; but we cannot, from his published works, form any idea of his brilliancy as a lecturer, in which capacity he appears to have succeeded in raising the most extraordinary enthusiasm among his students.

Contemporary with Cullen—William Hunter, indeed, was for a short time Cullen's partner—were the Hunters, both of whom very greatly improved physiology and surgery. John Hunter, in particular, not only greatly enriched physiology, but, by his museum, has excited a taste for physiology in the minds of others. He was a zealous vitalist. Contemporary also with Cullen was Brown, the author of a system of methodic medicine, long since extinct.

Next to these come the medical men who have either just passed away, or who still labour. The time to assign them their places is not yet come, and we close this chapter with the statement, that while there are many medical men who doubt the power of the human intellect to reason upon medical subjects, and who are therefore empirics; and while also we have plenty of methodics, in homoeopaths, hydropaths, animal magnetizers, and the like, there are still many who believe that medicine can only be cultivated successfully by means of principles derived from reasoning; in a word, dogmatists, like Hippocrates, Galen, Boerhaave, and Cullen.

PART III.

DIETETICS.

CHAPTER I.

ON SOLID ARTICLES OF FOOD.

THE constantly changing structure of man, composed of nitrogen, carbon, oxygen, hydrogen, iron, sulphur, &c., and the constant supply of carbon requisite for combining with oxygen in the body, so as to keep up the animal heat, demand a constant and regular supply of all these elements in the food. The most philosophical manner, then, of considering dietetics, would be to treat separately of the articles furnishing carbon, nitrogen, sulphur, &c. But several of the elements are combined in the most alimentary substances, and it will be therefore more convenient to divide the subject into three arbitrary chapters. In the first of these we will consider the properties of the more important solid articles of food; in the second, those which are necessarily fluid; and in a third, and very short chapter, we will glance at a variety of articles which are scarcely intended to furnish nutriment to the body, and which are commonly called condiments. We commence with the description of the solid articles of food.

Butcher meat, game, and fish, are solid articles of food, possessing many properties in common. They all contain, and to a large amount, fibrine, a peculiar substance, very rich in nitrogen, and one of the principal sources of the azote which the changing frame of man is constantly requiring. Fibrine constitutes the chief portion of the solid part of the muscles, or flesh, as it is commonly termed. This flesh is divided into white and coloured; and this distinction of colour is not only characteristic of different animals, but of different ages of the same animal. Thus the muscles of the calf are pale, while those of the full-grown ox are red.

All these substances, too, contain another peculiar matter, to which the name of albumen is given, and of which the white of the egg is a familiar example.

Albumen, in chemical constitution, exactly corresponds to fibrine; and these two substances afford an instance of what chemists call isomeric bodies. Isomeric bodies exactly agree, both in the elements of which they are formed, and in the proportion in which those elements are united; but as their physical appearance and qualities are different, it is supposed that some difference exists as to the order in which the particles are arranged.

Albumen is distinguished from other substances by coagulating, at a heat of a little more than one hundred and sixty degrees of Fahrenheit, into a solid tremulous mass.

Besides fibrine and albumen, this class of edibles also contains another azotised principle, called gelatine. This is more abundant in young animals than in old ones of the same species. It exists in the bones, tendons, ligaments, skin, muscles, and horns. It is bland and insipid. It is not transparent; is soft, dissolves in warm water, and when cooled assumes a tremulous appearance, and is familiarly known under the name of jelly.

In addition to these three principles, animal food contains another, to which the name of osmazome is given. Osmazome, or the extractive of flesh, is the principle to which the taste and smell, or the sapid qualities, are owing. It is limited entirely to the animal kingdom, with the exception of mushrooms, which contain either it or a substance analogous to it. It exists sparingly in young meats, as compared with old ones. It is found chiefly in the fibrinous parts. The gelatinous scarcely contain any of it. It is most abundant in dark-coloured animals, such as hares and other game, and it would almost seem to increase in meat in which putrefaction is allowed to commence.

Most animal articles of food contain also a greater or less proportion of oil, or fat, which, although it contains no nitrogen, is yet rich in carbon. Savages, in cold regions, who require more than the usual quantity of carbon, on account of the greater cold rendering a greater amount of animal heat necessary, consume an immense quantity of fat. More civilized nations, to supply a similar deficiency, use fermented drinks.

The varieties of butcher meat—beef, mutton, lamb, veal, pork, and venison; of poultry—fowls, geese, ducks, turkeys, &c.; of game—pheasant, partridge, grouse, hare, blackcock, &c.; of red-fleshed fishes—as salmon, trout, mackerel, and the like; and of white-fleshed fish—as cod, haddock, whiting, and many others, are too well known to require describing here.

The various modes of cooking these, boiling, roasting, stewing, and broiling, with the addition of the proper condiments, belong to the art of cookery, and, doubtless, not only increase the sapid taste and pleasantness, but also the digestibility of the articles so treated.

Generally speaking, animal food is both more nutritious and more digestible in proportion as it contains more fibrine and albumen, and less gelatine. For

this reason, the flesh of young animals is neither so nutritious nor so easy of digestion as that of older ones.

We now turn our attention to solid articles of food derived from the vegetable kingdom.

Animal food, we see, is the principal source of nitrogen to the system. Vegetable food chiefly consists of carbon, oxygen, and hydrogen. Both contain, in small quantities, the other elementary principles necessary for the support of the body. Nitrogenized forms of nutriment do, however, exist in vegetables, although the azote bears a less proportion to the whole mass.

Three nitrogenized principles are found in vegetables, two soluble and one insoluble in water. If the newly-expressed juices of vegetables be allowed to stand, a separation soon takes place, and a gelatinous precipitate is deposited, which, if freed from extraneous colouring matter, is of a greyish-white appearance. This substance is most abundant in the grains of wheat and the other cerealia. It is vegetable fibrine. It may be obtained from wheat-flour, and is then called gluten. The method of obtaining it proves that it is insoluble in water. If we heat the juice which remains after the fibrine has been deposited, a little coagulation takes place. This is owing to the presence of vegetable albumen. Vegetable albumen is principally found in nuts and certain seeds. The third nitrogenized principle in vegetables is called vegetable caseine. This is principally found in the seeds of pease, beans, and other leguminous plants. Some of the vegetable secretions also contain nitrogen; but such are inapplicable for the purpose of food, inasmuch as they act medicinally upon the system—are, in fact, drugs.

Vegetables contain other principles, which are composed of carbon, oxygen, and hydrogen. One of these is fecula, or starch, which contains a large proportion of carbon. It exists largely in many plants, especially in the cereal grains, as in wheat, combined with gluten. This latter compound, if mixed with water, and if leaven be present, undergoes the panary fermentation, as it is termed, and becomes bread. This is so important an article of food, that it demands some little consideration; and this seems to be the most proper place for so doing.

Flour of wheat contains sixty-eight per cent. of starch, and twenty-four of gluten. The flour of the other cereals is less rich in these two substances. That of oats contains fifty-nine per cent. of starch, and six of gluten; while that of rye contains only six per cent. of starch, and but a half per cent. of gluten. Flour, too, contains a small quantity of sugar. When the flour is mixed with water, and leaven is added, the mass swells, and carbonic acid is formed, part of which is given off into the air, but another portion of which is arrested in its progress through the dough by the adhesiveness of the gluten, forms in it numerous cavities, and causes the bread to be, as it is technically termed, light. The

reason that wheat bread is so much lighter than that of oats or rye is, that these latter substances contain so much less starch and gluten, and that, therefore, less carbonic acid is formed. In this panary fermentation, part of the starch is probably converted into sugar, in a manner analogous to that in which the starch of barley is converted into the sugar of malt, and which will presently be considered.

To return, however, to starch, we may at the same time observe, that its appearances are a good deal modified in different vegetables by accidental circumstances. Laundress' starch, arrow-root, tapioca, salop, sago, and many other substances, are all varieties of starch, or fecula.

Another vegetable principle is mucilage, or gum, not universally held to be nutritious. Gum, when pure, is quite colourless and soluble in water, and when so dissolved is ordinarily termed mucilage. It exudes naturally from the bark of many trees, as the acacia, cherry, plum-trees, and others. Asparagus, sea-kale, &c., owe some of their dietetical properties to mucilage.

Another non-nitrogenized vegetable principle is sugar. Sugar is not generally held to be, in its crystallized state, a nutritious agent. Honey is a variety of sugar, extensively present in many parts of vegetables, and which is used as a condiment. Mushrooms, too, contain another variety of sugar.

Vegetables likewise contain fats or oils, which assist in supplying the system with carbon. Florence oil is the one most used dietetically. This oil contains seventy-eight per cent. of carbon. Many vegetables which we daily use contain a small portion of oil, as also do nuts.

The following table shows the composition of some of the vegetables which are in common use:—

WHEAT FLOUR.*

Water,.....	10.0
Albuminous principles,.....	11.0
Starch,.....	71.5
Sugar,.....	4.7
Gum,	3.3
	<hr/>
	100.5

Some oil is unquestionably overlooked.

WHEAT BRAN.

Water,.....	13.1
Albumen,	19.3
Oil,	4.7
Husk, and a little starch,	55.6
Salts,	7.3
	<hr/>
	100.0

* The ash is omitted.

POTATO.*

Water,.....	75.52
Starch,.....	15.72
Dextrine,.....	.55
Sugar,.....	3.20
Albuminous principles,	1.41
Oil,.....	.24
Fibre,	3.26
	<hr/> 100.00

TURNIP.

Water,.....	89.50
Sugar,.....	5.61
Gum,.....	.11
Albumen, .....	.72
Pectic acid,	1.76
Oil,.....	.19
Fibre,.....	1.63
Salts,.....	.54
	<hr/> 99.88

It is clearly impossible to lay down an arbitrary rule as to the amount of food which ought to be consumed in the twenty-four hours. Of course it varies with the amount of exercise and labour, or, in other words, in proportion to the waste of the body. Among large bodies of our countrymen, about thirty-six ounces of highly nutritious food have been found necessary for hard-working and robust men. Parry, in a journey from his ships in the Arctic regions, which occupied sixty-one days, and during which time the men were occupied for twelve hours a day in rowing or dragging the boats, allowed his sailors daily an ounce of powdered cocoa, nine ounces of venison, or dried meat—considered to be equal to about twenty-four ounces of fresh meat—and ten ounces of biscuit. At the end of the forty-eighth day, two men were attacked with swelled legs, and other symptoms of a debilitated circulation. On their return to the ships, the whole crew were found unable to lift the weights which, before they left the ships, they easily could do. Parry concluded that the allowance was about one-third too small.

It is evident, however, that these men, from the hard labour and the cold to which they were exposed, creating a demand for an additional amount of carbon, required more food than is generally necessary. At the same time, it is certain that the amount proposed by some gentlemen for workhouse dietaries is very much too small. One table proposes only to allow twelve ounces of food per diem.

We now proceed to turn our attention to the different description of fruits usually met with upon the dessert table. We may premise, that fruit, from

* The ash is here also omitted.

the large quantity of water which it contains, serves more the purpose of a refreshing drink, than of an article of assimilation.

We begin with apples. This fruit is, in its wild state, the austere crab-apple of the hedges. It has been cultivated, however, from a very remote period. It is mentioned by Homer, as being one of the fruit-trees present in the gardens of Laertes and Alcinous. From his epoch down to our own day, the apple-tree has been carefully cultivated by Europeans, and an immense number of varieties of it have been formed by accidental circumstances. Ribston Pippin, Golden Harvey, Cornish Gilliflower, Old Nonpareil, Dutch Mignonette, and Count of Wick, are excellent and well-known table varieties.

Apricot is a well-known and agreeable fruit. The old English name for it is *a-precoke*, of which apricot is probably a corruption. The native country of the apricot-tree is uncertain. It has been supposed to be an inhabitant of America. Others, again, think that it has its origin in the oases of the desert of Egypt; and Professor Boyle is of opinion, that the Cabul mountains are the source, not only of it, but of many other fruit-trees. It blossoms soon, and hence is liable to be injured by the spring frosts. From this reason, the crop of apricots is, in this country, very precarious. The Moor-park and the Turkey are, we believe, the best varieties for the table.

Cherries are said to have been first cultivated in this country at Sittingbourne, in Kent, in the reign of Henry the Eighth. This county is still famous for a peculiar variety of this fruit, identical with the Montmorency cherry of France. Independently of the use of cherries at dessert, they are the flavouring ingredients of the excellent liqueurs—Maraschini and Kirshenwasser. The former is so called from the Dalmatian *Maraschi* cherry being employed in its manufacture. Cherries are sometimes dried in the sun, and stored up for winter use. There are a great many varieties of cherries. Among many others excellent for the table, we may mention—Elton, Royal Duke, Bigarreau, and Florence.

Currants are a very well-known hardy fruit, of which there are three principal varieties—red, white, and black, and an immense number of sub-varieties. The red and white are acid, but the black contains a peculiar aromatic principle. The article sold in the grocers' shops as currants, is the dried fruit of a small species of Grecian grape.

Gooseberries are the commonest of all fruits. They are indigenous in this country, and in other European regions of moderate temperature. The name is probably derived from the fruit being made into a sauce, and used for young geese. Gooseberries cannot endure much heat, or full exposure to the rays of the sun. The bad berries which we so often see hanging upon the bushes, are produced by one of these two causes. There are more than seven hundred varieties of gooseberries.

Figs can be made, in favourable seasons, to ripen in the south of England; and in Spain, Italy, Greece, and the islands of the Mediterranean, they are so plentiful as to form a considerable article of commerce. The appearances of the dried fruit are well known. For an engraving of the fig-tree, see Plate xxviii.

Grapes we have before had occasion to allude to. Muscadine, black Ham-burgh, black morillon, &c. &c., are the names of some of the different varieties.

Medlars have three principal varieties—the Dutch, the Nottingham, and the Stoneless. The first is esteemed for its size, and the crooked rustic appearance of the tree.

Melons have been cultivated in the East from time immemorial, and indeed they are essential in these countries, inasmuch as most cooling vegetables, except the melon, disappear on the approach of the great summer heat and drought. They are raised in hothouses in this country. There are many varieties of melons. Perhaps the Beechwood is the most esteemed.

Nectarines and peaches require a wall to grow upon, so as to ripen their fruit in this country. The peach-tree is indigenous in various parts of Persia, and of Turkey in Asia. It can, however, withstand our winters, unless they are unusually severe. Violette, Holme, and Elruge, are esteemed varieties of the nectarine; and of those of the peach, we may enumerate Red Magdalen, Bell-garde, and Grosse Mignonne.

Pears are indigenous in most parts of Europe. Innumerable varieties of them are grown. Perhaps the most delicious of the dessert varieties is the jargonelle.

The pineapple is the fruit of the *Ananassa sativa*, a native of the West Indies, and is also cultivated in the hot regions of Asia and Africa. It was introduced into this country at the close of the seventeenth century. Its culture here has been brought to great perfection; but the labour attending it is so great, that it is very expensive. Now, however, by the aid of the Atlantic steamers, pineapples can be brought to this country from the West Indies. There are about fifty varieties of pineapples. Moscow Queen, Black Jamaica, and Black Antigua, are favourite ones.

The plum-tree is indigenous in this country. The dried fruit of this tree is called prunes. Favourite varieties of plums are the Greengages, Magnum Bonum, Drap d'or, Washington, and many others.

The quince is not a common fruit in this country. The best variety is said to be the common one.

Raspberries are the fruit of the *Rubus idæus*, a native of this country. Its seeds resist the power both of digestion and putrefaction in an eminent degree. A dead body was discovered in Dorsetshire, which was ascertained to be the remains of a man who had been buried in the reign of the Emperor Hadrian. In this body rasp seeds were found, which, when planted, vegetated. Its fruit, when it ripened, was very similar to the common wild red raspberry. There

are a great number of varieties of raspberries, but which differ from one another less than the varieties of other fruits do.

Strawberries are the fruit of the *Fragaria*, and are amongst the most esteemed of our summer fruits. The name is derived from the practice of cultivating the plant with straw surrounding it. There are at least seven distinct varieties of fragaria, each having hundreds of subdivisions of fruit. The *fragaria vesca* is the kind found growing wild in our woods, and various modifications of which constitute the greater part of the varieties growing in English gardens. The *fragaria elatior* is an American variety, which produce the Hautbois strawberry. Keen's seedling is the name of a common variety of strawberries consumed in this country.

We had before occasion to allude to oranges. This delicious fruit is the produce of a tree, which not only has so palatable a fruit, but has also beautiful shining leaves, and a very fragrant flower.

Another description of food used at dessert, are nuts. As types of these, we may take filberts and walnuts.

Filberts are the fruit of the *Corylus avellana*. The term filbert was formerly applied to that variety of hazel nuts which had long husks. It is now, we believe, given to all kinds of hazel nuts, with the exception of the wild variety. As varieties of filbert, we may mention the red and white filbert and the cobnut. Kent is the most famous part of England for the production of filberts.

The walnut, or juglans, is a very large and handsome tree. It is a native of Asia, but was introduced into Europe by the Romans. It flourishes in the south of England, and as far north as Yorkshire. Almost every part of this magnificent tree is turned to some account. Its timber is strong, light, and takes a good polish. It is extensively used for the manufacture of gun stocks. Its young and green fruit is pickled, and its ripe fruit, when dried, is used in this country as an article of luxury; but in many parts of the continent, it forms a great part of the food of the poorer classes. The fruit contains a good deal of oil, which is extracted for the use of the painter, and also for lamps. Its leaves contain a juice which stains the hair black, and the skin brown. It was also considered to be efficacious in removing baldness, and as an antidote for poisons. Cowley thus sums up its virtues:—

“ On barren scalps she makes fresh honours grow;
Her timber is for various uses good—
The carver she supplies with useful wood;
She makes the painter's fading colours last;
A table she affords us, and repast.
E'en while we feast, her oil our lamp supplies;
The rankest poison by her virtue dies—
The mad dog's foam, and taint of raging skies.
The Pontic king, who lived where poisons grew,
Skilful in antidotes, her virtues knew.”

CHAPTER II.

THE FLUID ARTICLES OF FOOD.

THE articles of food which are necessarily fluid may be divided into three classes. One of these consists only of water; the next includes tea and coffee; the other comprises all those articles obtained from the fermentation of sugar—wine, beer, and spirits. We commence with the latter.

As we before mentioned, any saccharine fluid, if placed in a certain temperature, and in contact with some substance in a state of decomposition, in a short time acquires a new chemical constitution, and new properties. It contains a new compound of carbon, oxygen, and hydrogen—alcohol, which, in moderate doses, is stimulating, and in larger, intoxicating, and in still larger, poisonous, inducing coma.

Many natural saccharine juices are subjected to this process of fermentation. That of the vine is by far the most frequently employed, and the product so obtained is called, *par excellence*, wine; the juice of currants, gooseberries, and other fruits, is also fermented, and we call the fluid thus procured, currant wine, gooseberry wine, &c. Sometimes juices of other parts of vegetables are used—the sap of the stem of the birch and of the palm-tree (one of the sources of toddy and arrack), and that of the root of the beet, are instances of this. By the process of malting, the starch of barley is converted into sugar, and the product obtained by fermenting a solution of this is variously called ale, beer, and porter. The fermented juice of the apple is well known under the name of cider; and that of the pear, or perry, is also an occasional, but not so familiar a drink. Nor is it necessary that the saccharine solution be obtained from the vegetable kingdom. The milk of animals contains sugar; and the Tartars of the north ferment it, to obtain an alcoholic drink.

Then the alcohol, which in all these drinks is combined with many other products, may be separated by the process of distillation, to be afterwards alluded to. From all of them it can be obtained in a perfectly pure form; but, for dietetical purposes, flavouring ingredients are allowed to be mixed with it; and hence we have brandy, the distilled alcohol of wine; rum, that of the juice of the sugar-cane; and gin, whisky, and Hollands, from (or what is analogous to) beer.

Wine is the fermented juice of the *Vitis vitifera*. It has been known from the most remote ages. Noah, we read in the scriptures, planted a vineyard.

The ancient Greek poets ascribe the invention of it to the gods; and Homer calls it *θεῖον ποτὸν*, *the divine beverage*. Hippocrates used it medicinally, and also dietetically; and ever since wine has been used as a dietetical agent by all civilized nations. The vine plant is very extensively diffused. It may be said to vary from 55° N. lat. to 40° S. lat.; but its juice in the more northern latitudes by no means produces good wine. In North America, it extends as far as 47° of north latitude. There are a great number of varieties of it, which, along with the different manners in which the fermentation is managed, produce the different kinds of wine. The mode of manuring the vines, and of planting, training, and pruning them, must also have great influence. It is, we believe, well ascertained, that allowing the vines to grow unrestrained, is a sure way of deteriorating the juice obtained from them. Of the immense number of the varieties of the common vine, some idea may be formed from the fact, that in the reign of Napoleon, Chaptal collected in the gardens of the Luxembourg nearly fourteen hundred.

Upon the stage or degree of ripeness which the grape has attained, a good deal of the quality of the wine depends. When an effervescing wine—as champagne, for instance—is required, the grape is gathered before it is quite ripe. When a very dry wine, on the other hand, is wished for, the grapes are allowed to remain upon the tree for some time after they are ripe, until sometimes they become shrivelled and almost like raisins.

The juice of the unripe grape is called verjuice, and that of the ripe, must. Besides sugar, the latter contains extractive gum, glutinous matter, malic and citric acids, and bitartrate of potash. The seeds and stalks of the vine contain a good deal of tannin; and when they are allowed to remain long in the must, as in port, they communicate their astringency to the wine. The reason that the stalks, &c., are put into the must, is that they, becoming rotten, may produce the fermentation of this fluid.

The manner of managing the wine harvest, and the fermentation of the must in the claret countries of France, is as follows:—After the presses, vats, &c., have been all thoroughly cleaned and rinsed with spirits of wine, the grapes are gathered. A vat full of the most excellent fruit is then selected to form a mother cask. Into this vat the grapes are put, until they are a foot and a half or so deep. Two gallons of old brandy are then thrown upon them; another layer of grapes is next introduced; then more brandy, and so on, until the vat be full. When this is the case, some spirits of wine are poured in. The vat is then closed and covered with blankets, to preserve its temperature. It is left in this state about three weeks, by which time it has generally done fermenting, when it is racked off. While all this is going on, the other grapes of the vineyard are put into the press, where they are trodden, and their juice put into vats along with their stalks. These vats are not entirely filled, about a

foot being left to save loss from the agitation, &c., of the fermentation, causing the must to overflow. During the fermentation, these vats are carefully visited from time to time until this process has ceased, which is indicated by the liquor becoming cold and clear. The wine is then drawn off into barrels, which are only filled about three-fourths full. The remaining quarter is filled up out of the mother cask, and the barrels are then made air-tight. In the barrels, a secondary but insensible fermentation goes slowly on, which is of great importance with regard to the degree of acidity and bouquet of the wine.

The following formula will, perhaps, render the nature of the change which takes place in fermentation more intelligible. From every atom of sugar, one atom of alcohol, and another of carbonic acid is obtained. Say that an atom of sugar contains three atoms of hydrogen, three of carbon, and three of oxygen; one atom of alcohol contains three atoms of hydrogen, two atoms of carbon, and one atom of oxygen; one atom of carbonic acid contains no hydrogen, one atom of carbon, and two of oxygen: the atoms of the one atom of carbonic acid, and of the one of alcohol, if added together, will be found to correspond with the atom of sugar.

But, besides alcohol, other substances are formed during the fermentation of must. The most important of these is an acid called *œnanthic acid*, containing the same proportions of carbon and hydrogen as sugar, but differing in the amount of oxygen. This *œnanthic acid* combines with some of the alcohol, and acts upon it in the same manner as other acids do, the resulting product being an *æther—œnanthic æther*. Upon this *æther* the bouquet of wine depends.

Wine also contains a certain amount of acid. Of this the most innocuous is *tartaric acid*. It is, of course, obtained from the *bitartrate of potash* of the must. So far from this acid being injurious, its use is actually beneficial. Many wines, especially thin poor ones, contain, however, an amount of *vinegar* or *acetic acid*. The source of this *acetic acid* demands a little consideration.

After a *saccharine solution* has passed through the *vinous fermentation*, it has a tendency, provided oxygen be present, and the temperature be tolerably high, to pass into the state of *acetous fermentation*, and to become converted into *vinegar*. Without entering into minute particulars, we may state that *vinegar* differs from *alcohol* in having more oxygen in its constitution. When, then, *vinegar* is found in wine, it is owing to some portion of the wine having passed through the *acetous fermentation*. But, by taking proper precautions, this may be avoided. By means of *racking*, we get the wine clear of the undecomposed ferment, which would facilitate further fermentation; by keeping it in a cool cellar, we remove it from that degree of temperature which remarkably facilitates the process, and, by *bottling*, we in a great measure exclude oxygen. To effect

this latter purpose, however, still more effectual means are adopted. Sulphurous acid is a substance which is formed when sulphur is burned in the air, and which has a very great affinity for oxygen. A cask is filled with the vapour of this substance, and the wine poured in. By this means, any free oxygen which may be contained in the wine is combined with the sulphurous acid.

For many interesting particulars relative to the mixing of wines, or filling in, to the maturing of them, to fixing them, to sending them voyages, &c., and the rationale of these proceedings, we must refer to the various published treatises upon wine.

The alcohol of pure wine is not simply mixed with the bouquet, acids, extractive matter, &c., of the wine, but is combined with it in a manner unknown. The following table, taken from D. A. Todd Thompson, gives the amount of alcohol contained in each well-known variety of wine, and also the generic name and subdivisions of each variety, the place which produces it, and its qualities. The original table also contains the authority for the quantity of alcohol contained in each kind. This, however, we do not think it necessary to give in a popular work like this:—

TABLE OF THE PRINCIPAL KNOWN WINES, AND OF THE QUANTITY OF ALCOHOL IN WINES.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. '825 in 100 parts.	Qualities.
Portugal,	RED.—Port,(average)	22·96	{ Deep purple; rough; bitter sweet; spirituous.
		Vinho de Ramo,....	15·62	
		Collares,.....	19·75	
	WHITE.—Bucellas,	18·49	{ Pale straw; flavour delicate.
		Setuval,.....	—	
Spain,	Carcavellos,.....	18·65	{ Amber colour; sweet.
		.....	19·17
		.....	19·17
	WHITE.—Sherry,.....	Amontillado,.....	{ Deep amber colour; nutty and aromatic.	
		Paxarete,.....		{ Amber colour; sweet and aromatic.
	Malaga,.....(A.D. 166)	18·94	{ Amber colour; flavour delicate, rich, sweet.
		Pedro Ximenes,....	—	
		Lagrima de Malaga,	—	
	Malmsey of Sitges, ..	Priory,..	—	{ Resembles Malaga.
		—	
RED.—Tent, <i>Tintilla</i>, ..	.....	13·30	{ Purple; sweet; flavour strong, spicy.
	La Torre,.....	{		
	Peralez,.....			
	Segorve,.....		{	Sweet.
	Vinaroz,.....			
	Benicarlo,.....			
	Carinena,.....	{	Resembles claret.	
	Val de Penas,			
	Manzanares,.....			
Majorca,.....	Ciudad Real,.....	—	{ Resembles claret.	
France,	WHITE.—Alba flor,	17·26		{ Resembles Sauterne.
	Champagne,.....	13·30		
	Sillery,	13·30	{ Still, of an amber colour.	

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. .825 in 100 parts.	Qualities.
France,.....	WHITE.—Champagne	Ay, Hautvilliers, Epernay, Dizy, Avenay, Avise, Oger, Pierry, Closet, Lemesnil, Cramont, Menil,	13.30	{ Brisk or sparkling; delicate flavour and aroma; slightly acidulous; but some are still, or, at most, simply creaming; generally paler than Sillery.
		Verzy,	11.03	
	RED.—Champagne,...	Verzyna Mailly, Bouzy, St. Basle, Chamery, Ecuil, Villedemange,.....	—	{ Good colour and body, and a high, agreeable flavour.
		Clos St. Thierry,	—	
	WHITE.—Arbois,	{	—	{ Colour and aroma of Burgundy, with lightness of Champagne.
	Papillon,		—	
	Chablis,	{	—	{ Inferior to Champagne, but resembling it in some of their qualities.
	RED.—Burgundy,		14.57	
		Romanée Conti, Clos-Vougeot, Chamberlain, Richebourg, Romanée de Saint Vivant, Tache, St. George,	—	{ Beautiful, rich, purple colour; exquisite flavour, with a full body, yet delicate and light.
		Volnay, Pomand, Corton, Vosne, Nuits, Beaune Chamboil, Morey, Meursegault, Savigny-sous-Beaune,	—	
		Romanèche, Torins, Chenas, Tonnere, Auxerre,	—	
		Mont Racht,	—	
		La Perrière la Combotte, la Goutte d'or, la Genévrière, les Charmes Vaumorrillon, les Grisees, Valmur, Grenouilles, Vaudesir, Bougnereau, Mont de Milieu, Fuissey, Pouilly,	—	
		RED.—Hermitage,	32.2	
		Meal, Greffieux, Basas, Beaume, Raucoule,	—	
		Crozes, Gervant, Me-receurel,	—	
		Vin de paille,	17.43	
		Côte Rotie,	12.32	
	WHITE.—Hermitage,	Verinay,	—	{ Resemble Hermitage in flavour, but are weaker.
		Seyssuel,	—	
	Clarette of Die,	—	—	{ Light, sparkling, delicate.
	RED.—Tavel,	Chuzlan,	—	{ Bright rose colour; flavour and aroma delicate.
		Beaucaire,	—	
		St. Geniez,	—	
		Lirac,	—	
		St. Laurence,	—	
	St. Joseph,	—	—	{ Inferior.
	St. Georges,	—	—	

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. .825 in 100 parts.	Qualities.
France,.....	RED.—Cognac, .....	.....	12.32	{ Full rich colour; flavour of Ratafia.
	WHITE.—Vin de Co-	{ St. Peray, St. Jean.	—	{ Sprightly; colour of the violet.
	tillon,.....			
	Frontignac, .....	.....	12.79	{ Luscious; flavour of the grape.
	Lunel,	Clos-Mazet,	15.52	{ Bright yellow colour; less luscious than Frontignac.
	Beziars,	Cazoul, Bassan,.....	—	{ Resembles Sherry.
	RED.—Rousillon,.....	..... (average)	18.13	{ Great body and colour; becomes tawny when old.
		Bagnols sur Mer, Cosperon, Collioure, Torémila, Grenache, Terrato,.....		
	WHITE.—Rousillon,...	Rivesaltes,	—	{ Bright golden colour; fragrant aroma; flavour of the quince.
		Salces (<i>Maccabac</i>),....	—	{ Similar, inferior to Rivesaltes.
		.....	21.24	{ Red; somewhat rough; sweet.
	RED.—Claret,.....	..... (average)	15.10	{ Deep purple; delicate flavour; violet perfume.
		Lafitte, Latour, Leoville, Château, Margaux, Rauzan,.....	—	
		(Graves) Haut Brion, Haut Talan, Merignac, (average)	13.37	{ Resemble the better sorts of Burgundy, but are rougher.
		Artimino (Tuscan), Kissanos (Canadian),		
		Gorce, Larose, Brannouton, Pichow, Longueville,.....	—	{ Light wines; of good flavour.
		St. Emilion, Canon,...	—	{ Harsh; odour of burning sealing-wax.
	WHITE.—Claret,.....	Preignac, Beaumes, Langon, Cerons, Buzet,	—	{ Secondary quality.
		St. Nessans, Sancelé, Mont Basillac,.....	—	{ Sweet.
Germany,.....	Barsac,.....	.....	13.86	{ Amber colour; full; aroma somewhat like cloves.
	Sauterne,.....	.....	14.22	{ Amber colour; sweetish.
	WHITE.—Rhenish,...	Johannisberger (1788)	8.7	{ High flavour and perfume.
		Steinberg,.....	—	{ Strongest of the Rhine wines; sweetish.
		Rüdesheimer (1811)... Grafenberg,.....	10.72	{ Like the former.
		Markebrune Rothenberg,	—	{ Soft and delicate flavour.
	RED.—Rhenish,	(Hock) Hocheimer, (average)	13.68	{ Light; acidulous.
		Amanshausen, Leibfrankenmilch, Scharlachberger,	—	{ Considerable body.
		Laubenheim, Nierstein,	—	{ Light; delicate perfume and taste.
		Bodenheimer, (1802)	13.96	{ Delicate perfume and taste.
	Moselle,.....	Braunenberg, Pispot, Zeltingen, Wehlen Graach,.....	—	{ Light, pleasant flavour; high aroma.
			
Hungary,	Tokay, .....	.....	9.88	{ Brownish yellow when new, greenish when old.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. .825 in 100 parts.	Qualities.
Hungary,.....	Tokay,.....	Tokay Essence,.....	9.88	Syrupy, thick, muddy.
		Ausbruch,.....	—	{ Thinner and more vinous.
		Maslas,.....	—	{ Inferior to the two former.
Russia,.....	Ménser,.....	Ædinburg, Rusth, Ofen,	—	Sweet, resembles Tokay.
Italy,.....	Don Wine,.....	.....	.....	A white wine.
	Montepulciano,.....	.....	22.	Sweet, with high flavour.
		Aleatico,.....	16.20	{ Brilliant purple; luscious aromatic flavour.
	Verdea,.....	.....	—	{ Greenish colour and high flavour.
	Trebbiano,.....	.....	—	Golden colour; sweet.
	Albano,.....	Montefiascone,.....	—	Pale straw colour; light.
	Orvieto,.....	.....	—	{ Both red and white; light.
	Lacrima Christi,.....	.....	19.70	Red, luscious, sweet.
		Monte Somma, Gallite, Ischia, Nolla, Ottajano, Novella, Torre del Greco, Pozzuolo,....	—	The best Lacrima.
	Vino Greco,.....	.....	—	Sweet.
Sicily,.....	Marzala,.....	..... (average)	25.9	.....
		Twenty-one years old, submitted to Soemmerring's process five years,.....	18.40	Resembles Madeira.
	Syracuse,.....	.....	15.28	Both red and white.
	Etna,.....	.....	30.00	{ Resembles Madeira, with the harsh flavour of Sicilian brandy.
	Lissa,.....	.....	15.90	Resembles Claret.
Ithaca,.....	Red wine of Ithaca,.....	.....	—	Hermitage flavour.
Cephalonia,.....	Cephalonia,.....	.....	—	A dry red wine.
Candia,.....	Rithymo,.....	.....	—	{ A fine-flavoured white wine.
Cyprus,.....	Vino Santo,.....	.....	—	Pale straw-colour; sweet
Tenos,.....	Tenos,.....	.....	—	Luscious, sweet.
Tenedos,.....	Red Muscadine,.....	.....	—	Resembles Tokay.
Smyrna,.....	White Muscadine,.....	.....	—	Luscious, sweet.
Madeira,.....	Madeira,.....	..... (average)	22.27	{ Full; pungent, nutty, or bitter-sweet, rich, aromatic flavour.
		..... (West Indies)	21.20	
		Sercial,..... (average)	20.32	
		Malmsey,.....	16.40	
Teneriffe,.....	Teneriffe,.....	.....	19.79	Luscious, sweet.
Cape of Good Hope,.....	Constantia,.....	.....	14.50	{ Sweet, luscious, pungent.
		Red Constantia,.....	18.92	
		White Constantia,.....	19.75	
	Steen wine,.....	.....	10.60	Resembles Rhenish.
	Cape Muschat,.....	.....	18.25	Sweet.
	— Madeira,.....	..... (average)	20.51	Harsh, earthy taste.
	.....	.....	.....	{ Yellow, or topaz colour; sweetish; resembles Madeira.
Persia,.....	Shiraz,.....	White,.....	19.80	{ Resembles Tintilla, with a pitchy taste.
		Red,.....	15.52	
England,.....	Grape wine,.....	.....	18.11	Resembles Rhenish.
	Raisin wine,.....	..... (average)	25.12	Various.
	Currant wine,.....	.....	20.55	Brisk like Champagne.
	Gooseberry wine,.....	.....	11.84	Thick, narcotic.
	Elder wine,.....	.....	9.87	{ Sweet, luscious, flavour of the fruit.
	Orange wine,.....	.....	11.26	
	Cyder,.....	.....	9.87	
	Perry,.....	.....	7.26	Sweet,
	Mead,.....	.....	17.32	

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. .825 in 100 parts.	Qualities.
England,	Sycamore wine,	Juice fermented with sugar.	—	Strong and harsh.
Barbary,	Usuph,	Water in which raisins are steeped.		
Nepaul,	Sihee,	A grape wine.		
Hindostan,	Tari,	Fermented juice of the Palmira tree, Borassus flabelliformis, Callu, Teildy, Saura.		
	Sinday,	Fermented juice of Elate sylvestris, the wild date.		
China,	Cha,	Nearly the same as Tari.		
	Mandurin,	Boiled rice, fermented.		
Tartary,	Koumis,	Fermented mare's milk.		
	Airen,	Fermented cow's milk.		
	Kanyangtsyen,	The flesh of the lamb fermented with rice and other vegetables.		
Africa,	Millaffo,	Fermented juice of the palm-tree, Congo.		
	Pombie,	Fermented millet, Cafres.		
Brazil,	Kooi,	Fermented juice of Apples.		
Mexico,	Palque,	Fermented juice of the Agave Americana.		
Norway,	Birch wine,	Juice of Betula alba fermented with sugar.		

Beer, with its varieties, ale, porter, and stout, is essentially a wine. But its great consumption in this country may claim for it a short separate consideration.

Extracting saccharine solution from grain, and from it preparing a fermented liquor, or brewing, is believed to have been practised by the Egyptians, and was a common custom among the Teutonic tribes. Tacitus, in his account of barbarian Germany, alludes to it; our own Saxon ancestors in this manner prepared several intoxicating drinks, and beer is still the most extensively employed beverage by the lower orders of England, Germany, and the north-west of Europe.

The process for converting the starch of grain into sugar is called malting. The grain usually fixed upon in this country is barley. The exact process to be followed is strictly laid down by excise regulations, and is, perhaps, less scientific in its details than could be wished. The barley is first steeped in cold water, for a period which must not be less than forty hours. It in this manner imbibes moisture, and increases about one-half in weight, and about a fifth in bulk. A small quantity of carbonic acid is evolved, which owes its formation in part to the oxygen of the water. The steep water gradually acquires a yellow hue, and the smell and taste of water in which straw has been steeped. It holds in solution a little extractive matter, derived from the husk of the grain.

This water is allowed to run off, and the steeped barley is piled into a heap about sixteen inches deep, called the couch. Here it stands six-and-twenty hours. It is then spread upon the floor of the malt-kiln, but to a much less depth. Here it is turned twice a day with wooden shovels. After some days it is put into a kiln, and exposed to a heat of about a hundred and forty degrees. It is now malt, to be distinguished from barley by its very sweet taste.

The changes that take place during this process are very interesting. After the steeped barley has remained in the couch for some little time, it begins to absorb oxygen from the air, and to form carbonic acid. Its temperature becomes much raised, being about ten degrees higher than that of the surrounding atmosphere, and it becomes moist, and exhales a peculiar but not unpleasant odour. At this time the roots of the grain, or what would be the roots were the grain sowed in the ground, begin to shoot. Next, the rudiment of the stem begins to grow. While these two products are growing, the kernel, or mealy part of the grain, undergoes a considerable change: its colour becomes whiter, its texture softer, and a great part of its starch, and some of its gluten, disappear, and sugar is found in their place. Were the root and stem allowed to continue growing, this sugar would be used for their nourishment. The roasting in the kiln, however, entirely destroys all vitality in the grain; the stem ceases to grow, and the maltster has a substance, malt, of which about one-sixth is pure sugar.

Our readers will not have failed to observe, that the theory of the process consists in such measures being taken as will allow the seed to begin to shoot, as it would do if buried in the earth, and in the cutting short of the process before the sugar, which is formed in germination, is consumed.

The following are the results of Dr. Thomson's analyses of malt and barley:—

	Barley		Malt.
Gluten,.....	3	.....	1
Sugar,.....	4	.....	16
Gum,.....	5	.....	14
Starch,.....	88	.....	69
	<hr/>		<hr/>
	100		100

The best kind of malt, *i. e.*, the one which contains the most sugar, is the pale variety. The brown or black kind is prepared by exposing it to a high temperature in drying, in which part of its sugar is destroyed. It is employed for giving flavour and colour to stout, &c.

The process of brewing is familiar to all. The malt having been ground in a mill, has hot water poured upon it. In this manner a saccharine solution is obtained. This is placed in a suitable temperature, and some ferment or yeast is added. Fermentation rapidly begins, the sugar is converted into alco-

hol, an infusion of hops is added to flavour it, and the beer is then put into barrels. Porter differs from common beer, in being partly made from high-coloured malt.

Cyder or Cider is the fermented juice of the apple. It is extensively prepared in Herefordshire and Devonshire, in Normandy, in Waterford and Cork, and in many parts of the States of America. The apples are put into a stone trough, in which a circular stone is made to revolve. When the whole apple is completely ground to pulp, the pulpy mass is put into a sieve, and exposed to pressure. A thickish brown juice exudes, containing the saccharine solution natural to the apple; the peculiar aroma of the apple, and probably a little vegetable matter which passes through the sieve, act as a ferment. When the fermentation is over, the cider is either bottled or barrelled. Perry is a similarly fermented juice of the pear.

Although we have seen that the ancients, from the earliest period, were in the habit of using, and knew the properties of fermented drinks, yet they were not aware to what principle the stimulating effect of wine was owing, and consequently they were unable, and made no attempt, to separate the alcohol. This was first done by means of distillation by the Arabian chemists; and distilled spirit, containing about one-half of water, and variously flavoured, is now extensively used under the various names of brandy, rum, gin, Hollands, &c.

Arnoldus de Villa Nova, a chemical physician in the fourteenth century, is the first writer who mentions alcohol as an intoxicating spirit, obtained from the distillation of wine, and he describes it as a recent discovery. He considered it to be the universal panacea so long sought for. His disciple, Raymond Lully, was most enthusiastic about the discovery. He declares this "admirable essence of wine" to be an emanation from Heaven, a newly-revealed element, destined to revive the decrepitude of his times. Distilled spirits did not come into common use as a drink until long after this period.

Brandy is distilled from wine; rum, from the fermented juice of the sugar-cane; and gin, whisky, &c., from what is essentially beer.

Brandy is prepared in all wine countries, that obtained from France being held in the highest estimation. It is procured indifferently from red and white wines. It is also obtained from the fermentation and distillation of the dregs and pressed grapes. Brandy, however, obtained in this manner, is not considered so good as that procured from the distillation of wine. When recently distilled, brandy is colourless, but, by keeping, it soon acquires a little colour, owing, in all probability, to some change which takes place in the soluble matter which it contains. Brandy contains, on an average, rather more than fifty-three per cent. of alcohol.

Rum is obtained by distilling the fermented liquor of the molasses: that

used in this country comes almost entirely from Jamaica. Its greatest employment is on board our men-of-war. More than seven hundred thousand gallons are annually consumed by the navy.

The natural, and probably the most efficacious manner of converting grain into spirit, as is done in the manufacture of gin, whisky, and Hollands, would be to convert the grain into malt, the malt into beer, and then to distil. But in this country the maltster pays one tax, and the distiller another; and hence it is of importance, in an economical point of view, to use as little malt as possible in the distillation of such spirits. It is accordingly found, that if gluten be added to water and raw grain, (*i. e.*, a solution of starch,) and if a moderate temperature be kept up, a portion of the starch actually becomes sugar. It is ascertained, too, that this change is much promoted if sugar be present in the mixture. It is now, we believe, the common practice for our distillers to mix, along with barley, oats, and rye, a portion of malt. Pure sugar would probably be preferred; but, until a very recent period, it was prohibited by the Excise laws. As soon as the starch is converted into sugar, the sugar is allowed to ferment: in this manner alcohol is obtained, which is separated from the water and other substances composing the rest of the fluid by distillation. Of course, our readers are aware that distillation in this case depends upon the fact, that the vapour of alcohol is formed at a lower temperature than that of water. By applying the requisite degree of heat, the vapour of the alcohol rises, and passes into a receiver, where it is condensed, the water being left behind.

Spirit thus obtained, however, is very impure, containing a quantity of both water and a peculiar volatile oil called oil of grain. These are, to a certain extent, got rid of by repeated distillations, and by the use of pearl ash, which, from its powerful affinity for water, checks the rise of this fluid in distillation. Whisky contains about as much pure spirit as brandy, but gin and Hollands contain rather less. The two latter are, moreover, flavoured by the addition of juniper berries.

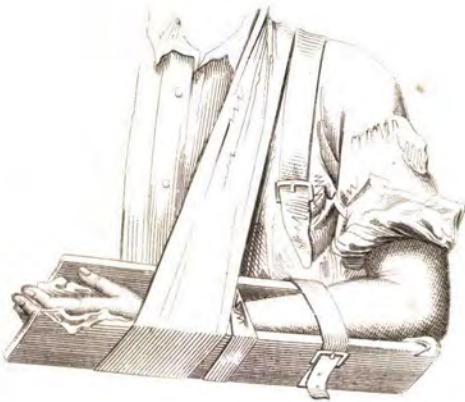
The physiological action of all alcoholic or fermented drinks, is, if they are taken in excessively large and poisonous doses, to produce death in the way of pure coma. Sometimes there are a few convulsions witnessed in fatal cases, but these are rare, and have only been observed in young patients. This degrading mode of death is seen in those who, generally for a wager, have swallowed at once a large draught of ardent spirits. When spirits are taken in a less, but in too excessive a quantity, or when too much of any of the undistilled fermented liquors is taken, symptoms of poisoning are produced—the indications of which are, excitement, giddiness, confusion of thought, loss of voluntary motion, and various mental affections, varying in different characters according to the habits and mode of thinking of the drunkard; these are followed by somnolency, often of a deep and profound character, which ceases

after some hours, but which is followed by sickness, headache, stupidity, giddiness, &c.

Should, however, any one be frequently guilty of this crime of drunkenness, other diseased symptoms—at least in many cases—make their appearance. These may be divided into two classes: the affections of the digestive organs, and those of the nervous system. Of the first of these are chronic functional derangement of the stomach and diseases of the liver, dependent upon congestion, caused by the spirit. But the affections of the nervous system are more interesting. Insanity sometimes appears to proceed from long-continued drunkenness; and a peculiar disease—the consideration of which was purposely deferred to this place—*delirium tremens*, is, with one or two rare exceptions, caused either by the habitual excessive use of alcoholic drinks or of opium. The symptoms of *delirium tremens* are, perfect inability to sleep, trembling of the voluntary muscles, and the seeing of phantoms or strange sights, always of a disagreeable nature, and fancying other unpleasant absurdities. The delirium is, however, of a very peculiar character, and quite different from that witnessed in any other nervous disease. The patient is, to a certain degree, rational, and to be reasoned with, and, indeed, is sometimes quite aware that the phantoms are unreal; in this respect differing remarkably from the delirium of mania or fever. In one case of this disease which is recorded, the gentleman was exceedingly annoyed by seeing an immense number of little demons dancing in the air of the apartment and around his bed, jeering, pointing, and making faces at him. The patient, however, made no complaint of this, and it was only in answer to a question, as to what made him look every now and then so strangely up and down the room, that he declared what he saw; but stated that he was not frightened, that he knew they were part of the disease, and that when he buried his head underneath the bedclothes he got relief. Another curious example of this species of delirium is not without its interest. A Cumberland farmer, very fond of whisky, had *delirium tremens* very often, and whenever this was the case, he fancied the room was full of large rats. As he gradually got better, their number gradually disappeared. So well aware of this was the fellow, that when, in the height of his disease, he sent for his medical attendant, he would say, "Oh, doctor, but I'm awfu' the day, the room's uncommon full on them." Then in a little, "I'm thinking, doctor, I'm on the mend, there isn't aboon a hundred left;" and at last, "I shall gang to the market the morn, I only see the tail of the big black one in the corner of the room." The previous habits of the patient seem to cause, in some measure, the varying nature of the delusion. Thus the patient in the first case, at least in the intervals of his drinking-fits, was much given to religious reading and exercises, and he saw demons, while the Cumberland farmer thought continually of corn-stacks and rats.

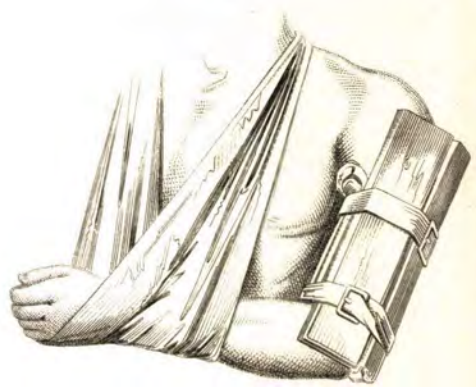
FRACTURES.

Fig. 1.



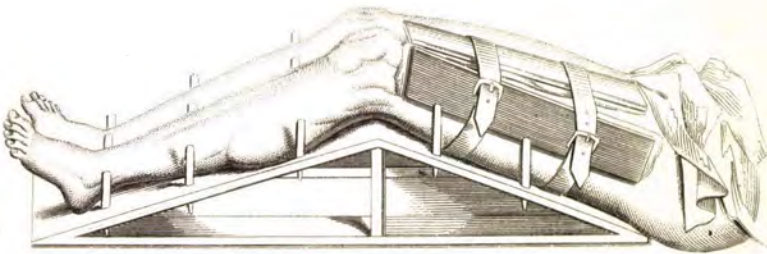
FRACTURE OF FORE ARM

Fig. 2.



FRACTURE OF ARM ABOVE THE ELBOW

Fig. 3.



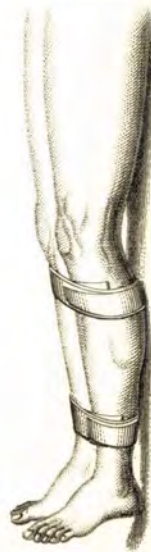
FRACTURE OF THIGH. TREATMENT WITH SPLINTS

Fig. 4.



FRACTURE OF COLLAR BONE

Fig. 5.



TREATMENT OF BROKEN THIGH WITHOUT SPLINTS.

Delirium tremens much more usually follows excess in spirits than in wine and beer. It is sometimes excited by a sudden abstraction of the stimuli which the person has been in the habit of taking, but it very often comes on when no such abstraction or diminution has been made. The first two attacks are, perhaps, almost uniformly recovered from,—the third is frequently fatal; but some hardened constitutions manage to weather a great number of attacks.

The treatment of delirium tremens consists in the frequent administration of stimulants and opium. It is the best example we possess of excitement with debility.

Fermented drinks, however, taken in moderate quantity, produce none of the above ill effects. On the contrary, they promote digestion, they supply carbon to the system, they give energy to all the animal functions, and, in a particular manner, relieve the lassitude of the nervous system, and call into action the intellectual powers.

Of the medicinal use of wine and other stimulants we have often had occasion to speak; whenever death is threatened by debility, and particularly in the way of syncope, we place our main dependence upon them. Wine and beer, too, possess decided tonic properties. Fermented drinks, and especially spirits, are well known to be antispasmodic.

The dietetical use of wine, &c., is important. It has often been asserted, that the daily use of wine is not only unnecessary, but injurious. Many who appear to be firmly convinced that the object of man here is to accumulate nitrogen, have maintained that no dietetical substance is of any use which is not composed of azote; and we have all heard the triumphant declarations of itinerant lecturers and the like, that a quart of beer or a bottle of wine only contained a grain or two of gluten, or nutrition as they call it; that a loaf of bread is as nutritious as a pipe of wine, and other similar assertions. They were joined in this opinion by many respectable medical men. The most extraordinary part of the proceeding is, that notwithstanding these gentlemen are so certain of the accuracy of their opinions, they are never astonished that their theory is not reduced to practice; and, what is still more surprising, they themselves habitually drink stimulants just like other people. To all such opinions relative to the injurious or unnecessary use of wine as a dietetical agent, one satisfactory answer may be given. A custom, practised from the remotest antiquity, and by all nations and in all ages—a custom, in a word, nearly as ancient and as universal as eating or sleeping, must have its origin in some natural want and craving of the system. It might be, and it was, difficult to explain the nature of this want, and many might be inclined to doubt of the tonic effect of wine upon the stomach, and its refreshing and stimulating one upon the nervous system, were it all the effects which it produced upon the system. Now, however, the matter is better understood.

We now know that man requires not only a daily supply of nitrogen, but of other elements also. Among the rest he needs a large quantity of carbon, not only to assimilate with his textures, but to combine with oxygen in the different parts of the body, so as to keep up that degree of heat which is necessary for the performance of vital action. Now, the principal sources of carbon are fat and fermented liquors. And upon examination we shall find that, in proportion as men require additional heat, so does their consumption of these two dietetical substances increase, although they are ignorant of the reason of their so doing. If, as Leibig remarks, we, in hunting or fishing, were exposed to the same degree of cold as the Samoyedes, we could like them swallow a dozen tallow candles. "We should then," he says, "be also able to take the same quantity of brandy and train oil without bad effects." It is obvious that the fermented drinks are often a very agreeable and necessary substitute for fat. It is probably to the discovery of fermentation that man owes his not being, like other animals, confined to a small range of the globe, that he has been able to leave his native Asiatic plains, and to face with impunity colder heavens. This is the only explanation which can be given of the fact, that of all created beings, man is the only one which can thrive in all climates.

The refreshing effect of fermented liquors upon the nervous system doubly plays an important part in relieving unpleasant sensations, and partly, perhaps, in warding off serious disease. Of the natural craving for something of this nature, we have a striking example in the great increase of opium-eaters in this country since the introduction of temperance associations.

Tea and coffee are the names given to the infusion of the leaves of various species of *Thea*, and of the berries of the *Coffea arabica*. The extensive use of these two articles makes them very interesting in a dietetical point of view.

Tea is of comparatively recent introduction into Europe. Soliman, an Arabian merchant, who wrote an account of his travels in the ninth century, states that it was then a common beverage of the Chinese. In the early part of the seventeenth century it was used by the Persians. In 1660 a duty was levied upon tea in England; but very little can have been introduced into the country, for, four years later, we find the East India Company purchasing, for the sake of making a present to Charles the Second, two pounds and two ounces of tea. Six years after this, the same Company imported nearly five thousand pounds of the article in question, this being, probably, the first time that they considered it an article worthy of traffic. Since that time the use of tea as a beverage has gradually increased; and now, probably, not far short of forty millions of pounds are consumed in this country.

The *Thea* is a plant belonging to the natural family of *Ternstroemiaceae*. The species of it are few in number, but it is not ascertained from what particular varieties the different descriptions of tea are obtained. Two kinds of tea plant

are cultivated in our greenhouses, the *Thea viridis*, or green tea, and the *Thea bohea*, or black, the former being the larger of the two, and also much the hardier. It is not, however, certain, if the difference between green and black tea does not depend upon some difference in its drying, &c., and not upon the variety of the plant from which it is gathered. From whatever source however obtained, all the teas imported into this country are divided into green and black, or rather brown. To the latter belong bohea, congou, campoi, souchong, caper, and pekoe; and to the former, twankay, hyson skin, hyson, imperial, and gunpowder. Tea, too, is considerably adulterated with the leaves of plum-trees, ashes, &c. Before the East India Company lost their monopoly, but little of the adulterated tea found its way here, inasmuch as officials, with good salaries, were appointed to search for adulterations in the teas destined for this country. Now, however, all kinds are shipped.

Coffee, like tea, is of recent introduction into the dietetical scale of the modern world. The coffee of the shops is the roasted albumen of the seed of the *Coffea arabica*, one of the *Rubiaceæ*, a native of Arabia Felix and Ethiopia, but extensively cultivated in Asia and America. It is an evergreen shrub or tree, of from fifteen to twenty feet in height. The varieties of coffee are distinguished by the names of the places from which they are imported. Mocha, or Arabian coffee, is small and dark-coloured, and in the highest estimation; the Java and Malabar kinds are larger and paler; Ceylon coffee, and that from the West Indies, has a bluish or greenish grey tint. The ground coffee of the shops is very much adulterated with both chicory and roasted grain.*

Those who consider nothing taken into the stomach as useful and nutritious unless it is loaded with nitrogen, make the same objection to the dietetical use of tea and coffee, as they do to that of wine. They contain, they say, no nourishment, and are not only useless, but positively injurious. Now, to all this we can make the same answer as we did in the case of wine—their use among civilized people has become so universal, that it is clear that they supply a natural want and craving. In the same manner as we remarked about fermented drinks, we might observe of them, that they possess a soothing effect upon the nervous system, often of great importance to health and comfort, and that they certainly act as tonics upon the stomach. But the researches of modern chemistry have informed us still more minutely of their uses; and as we found that alcohol supplied carbon, so also do we now find that tea and coffee supply an important substance to the system.

Tea and coffee respectively contain a peculiar substance, to which the name

* This adulteration is easily detected. If the suspected coffee be put into a glass of water, if pure, it will swim; if it contain chicory, that substance will sink, and communicate a deep red to the water. The presence of grain may be detected by iodine.

of *Theine* and *Caffeine* is given. They are nearly analogous in their nature. Their exact composition is as follows:—

	Theine.	Caffeine.
Carbon,	50.101	49.77
Hydrogen,	5.214	5.33
Nitrogen,	29.009	28.78
Oxygen,	15.676	16.12

They are, as will be immediately observed, however contrary to the general opinion, extremely rich in nitrogen—very remarkably so for vegetable productions. We can therefore account for the fact, that many who live almost entirely upon tea do not lose flesh. But the cause of their universal use, probably, lies deeper. The constitution of these two bodies, with the addition of water and a little oxygen, is exactly analogous with that of bile, or rather of the peculiar matter of bile. Our readers will remember, that while one portion of the bile is recrementitious, another is the natural stimulant to the intestinal canal. Now, it is a very curious fact, that the use of tea and coffee has become universal only along with the spread of modern civilization, which is characterized, not as of old, by the torture of the body, but by the torture of the mind, and that, as we had before occasion to observe, nothing influences the secretions of the stomach and liver so much as such mental anxiety as is now but too common.

The action of tea and coffee upon the nervous system differs from that of alcohol, inasmuch as these substances never intoxicate. Their soothing and tranquillizing effect is, however, smaller. The injury done by excessive use of them to the nervous system is, perhaps, as great. Nothing, however, like delirium tremens is produced. The common results of such indulgence are excessive nervousness of mind and body, and that state of the constitution which is designated as mobility of the nervous system, and which so remarkably disposes the body to many varieties of nervous diseases.

It is a very curious fact, that cocoa and chocolate contain a peculiar principle analogous in constitution to theine and caffeine. They are both prepared from the *Theobroma cacao*, an inhabitant of America.

The properties and varieties of water have been before considered. Its dietetical use is twofold. It supplies oxygen and hydrogen; and also every part of the body necessarily contains a quantity of water, which is constantly being absorbed, and requires refurnishing. Our readers will have noticed that wine, beer, fruits, &c., contain a very large proportion of water, as also do the two common beverages, tea and coffee.

CHAPTER III.

ON CONDIMENTS.

CONDIMENTS will occupy our attention for a very short space of time. A condiment is an article of food, which is neither calculated to be converted into animal texture, to furnish the body with carbon, to supply moisture to the system, or to soothe the nervous system. Its use is to make the food more grateful, or to promote digestion.

Common salt is usually placed among the condiments. This, however, is scarcely correct. Chloride of sodium is as necessary in the constitution of the human body as nitrogen. But besides being appropriated by the textures, salt undoubtedly renders food of most descriptions more savoury and palatable. "Can that which is unsavoury," says Job, "be eaten without salt?" Another condiment is vinegar, used as an ingredient of sauces, and still more as the basis of pickles. Such undoubtedly render many articles of food more palatable. Mustard, pepper, curry, and other hot spices, alone, and mixed with pickles, are eaten, particularly in hot climates, to stimulate the languid stomach. Sugar is another instance of an agreeable condiment.

But it is not so much the reception into the stomach of these substances that renders the food more savoury and digestible—it is still more owing to their due admixture, and, in some cases, to the presence of heat. To use condiments in right and fitting proportion is one of the offices of cookery.

PART IV.

IRREGULAR MEDICINE, OR QUACKERY.

IRREGULAR Medicine, or Quackery, is usually associated with imposition, and the greater number of its professors are undoubtedly impostors of the first magnitude. But there is no necessary connection between the two. A man may, from ignorance, from peculiarity of mind, or from other circumstances, as conscientiously hold erroneous opinions in medicine, very dangerous in their result, as he may entertain erroneous opinions upon other subjects. Another mistaken notion generally entertained regarding quackery is, that it is only practised by unlicensed medical men. Unfortunately, there is no lack of quackery among physicians, surgeons, and apothecaries of the most regular description, sometimes dependent upon fraud, but more frequently to be attributed to the imperfect education which the law absolutely requires from them.

It is useless to speculate upon the origin and early history of medicine. We have every reason to believe that for long it was a rude, undigested mass, and probably of little use. More than two thousand years ago its various facts were reduced into a system, and general principles of medicine were established by Hippocrates. Now this system of Hippocrates constitutes what is called medicine. It has been taught, and the practice deduced from it has been followed, by great numbers of the medical men of each generation ever since. Time has shown that many of its dogmas are erroneous; time has discovered much that may be added to it; but time has also shown that it is a science composed of general principles, deduced from the attentive observation of facts, and that all satisfactory practice must be based upon these general principles. In the preceding pages we have endeavoured to present an outline of such principles. They constitute regular medicine. Almost ever since the time of Hippocrates, there have been, and there still are, in the medical world, two sects which embrace the various forms and varieties of irregular medicine. One of these, whose professors call themselves empirics, profess to do away with reason altogether in the practice of medicine, and to confine themselves solely to

the observation of isolated facts. The other sect, on the contrary, acts entirely in consequence of a theory, not, however, obtained from the close observation of facts, but which is, in fact, a fancy more than a principle. Instances of this sect are the ancient methodists, the more recent medical alchemists, and the modern homœopathists and hydropathists. The methodists had their metasyncrasy; the alchemists sought for a substance which would change every metal into gold, and cure all diseases; the theory of the homœopathists is, that like cures like; and the hydropathists have their metasyncrasy also, and think that water expels all unhealthy matter through the pores of the skin; but it is to be observed, that no facts confirm the existence of any of these laws; that they were not set up from even the mistaken observation of facts, but from pure theory, or whim.

It is true that all these sects (as also the empirical sect) point to facts or results. Just as the alchemists sometimes pretended that the gold found in their crucibles was not the product of the gold ore they had put in, but of the powder of projection, so do the homœopathists, &c., point to cures which they attribute, not to nature, but to globules. We trust that no one who has read the preceding pages—particularly the observations upon the actions of remedies, the natural tendency of most diseases to a spontaneous cure, and the influence of hope and other pleasing sensations upon the mind and body—will have any difficulty in understanding the true nature of these recoveries.

The most disgraceful set of quacks are the patent-medicine people, who are perfect impostors, and whose only motive is the money they obtain by the sale of their wares. The great majority of patent medicines consist of purgative pills. We have before seen that purgatives are only useful in certain states of the system, and in certain diseases, and that their habitual use is highly improper. The quack medicines for particular diseases are equally absurd, inasmuch as—and if for no other reason—the same disease at different times and stages requires very different treatment. We will not waste farther time upon them, except to say that, doubtless, every year many thousands die from the direct or indirect consequence of trusting to these impostors and their advertisements.

It is to an examination and exposure of two somewhat fashionable follies—homœopathy and hydropathy—that we purpose in this chapter to confine ourselves. If this little work enable any one to see what medicine is, and what it is not, our labour will not have been in vain. Of this we feel assured, that the only rational manner to set people free from the impositions of quackery, is to give them some correct opinions regarding medicine. “We may rest assured,” says a writer in the ‘Northern Journal of Medicine,’ “that quackery will not cease to prosper under some one of its many disguises, as long as men in general remain so little acquainted with medicine.”

The homœopathic theory was the invention of Hahneman, a German physician, who was born about the middle of the last century. At the commencement of the French Revolution, an opinion among a certain set of people in Europe seems to have been, that "everything was naught," and must be altered. It was not to be expected that, in the general scepticism as to the value of everything existing, medicine was to escape. Great, however, as was the scepticism regarding everything old, the credulity respecting the new opinions and theories which were to supplant them was boundless. Moreover, at this time Hahneman could not get a living by practising in the regular way. This was the time, and here was a strong inducement for him, to found a new system of medicine.

The foundations for this new system were particularly slight. It so happened that, being in a state of health, he took a dose of Jesuit's bark. Afterwards he had, he says, an attack of intermittent fever. Every one knows that bark cures intermittent fever. These being his premises, he reasoned in the following manner:—Experience of many generations of practitioners proves that bark cures the ague; after taking it, I have had the ague; it is therefore equally clear that bark causes ague. It naturally follows that every medicine which relieves a symptom, in a healthy state will produce that symptom; therefore, all that is necessary to be done in medicine is to find out what symptoms various drugs will produce, and when these occur in disease to administer such. This is a new system of medicine; its motto shall be, Like by like is cured—*Similia similibus curantur*; and its name, Homœopathy.

The absurdity of all this is palpable enough. Even the attempt at analogy—for reasoning it cannot be called, in the attempt to prove bark a cause of ague—is feeble enough. Hahneman took the bark, and after so doing was indisposed. Now, this indisposition either was ague or it was not. If it was, why attribute it to the bark? Ague was a common disease in his part of the country; why did not he take it, like other people, from exposure to malaria? Anyway, it cannot have been the bark that caused it, for large doses of bark have often been taken, and while vomiting and a general febrile state have been observed, nothing like intermittent fever has been known to follow its use. If, on the other hand, Hahneman had not ague, then the whole theory is at fault, bark does not cure ague—*similia similibus non curantur*—and the great experiment upon which homœopathy is based affords anything but favourable support to it.

That such objections as these could be offered to his theory, gave, probably, very little annoyance to Hahneman. The idea was a new one. At this particular period this was sufficient. Hahneman promulgated his doctrines, and soon obtained disciples and followers, and also patients.

When this practice of administering to a diseased person such medicines as,

if he were well, would produce such a disease, was first begun, the disease was, of course, very much aggravated. This we can readily imagine. A person suffering from extreme nausea and vomiting would, if he took a grain of tartar emetic, become a great deal worse. Any one who had inflammation of his stomach, would, if he took an ordinary dose of arsenic, feel the pain and heat increase, and probably would die. A man three-parts tipsy would, if he took more wine, become, not sober, but regularly drunk. "With large doses," says one of the homœopathists, "patients may be treated homœopathically; but then we may frequently expect a positive increase of the disease, or even death." Had, therefore, Hahneman gone on as he had begun, the affair would, to use a vulgar expression, have been immediately "blown." To get out of this difficulty, Hahneman broached, perhaps, the most impudent—and this is saying a great deal—barefaced sub-theory ever published. The efficacy of a medicine did not, he maintained, depend upon its quantity, and increase as the dose was enlarged. This was a vulgar error, and quite the reverse of the truth. The more you diminished a dose, the more potent did it become; and he went on diminishing his until the quantity of the drug was so small, that neither could its physical characters be perceived, nor its presence recognized by chemical tests. In this manner he certainly obviated the aggravation of the symptoms.

The manner in which these very minute doses are obtained is as follows. We quote Dr. Pereira:—"Suppose the substance to be a solid, reduce it to powder, and mix one grain of it with ninety-nine grains of sugar of milk; this constitutes the first attenuation. To obtain the second attenuation, mix one grain of the first attenuation with a hundred grains of sugar of milk. The third attenuation is procured by mixing one grain of the second attenuation with ninety-nine grains of sugar of milk." In this way he proceeds until he arrives at the thirtieth attenuation. The following table will show the strength of the various attenuations, with the signs he employs to distinguish them:—

Signs.	Strength of One Grain.
I.....First attenuation,.....	One hundredth part of a grain.
2.....Second,.....	One thousandth.
I.....Third,.....	One millionth.
II.....Sixth,.....	One billionth.
III.....Ninth,.....	One trillionth.
IV.....Twelfth,.....	One quadrillionth.
V.....Fifteenth,.....	One quintillionth.
VI.....Eighteenth,.....	One sextillionth.
VII.....Twenty-first,.....	One septillionth.
VIII.....Twenty-fourth.....	One octillionth.
IX.....Twenty-seventh,.....	One nonillionth.
X.....Thirtieth,.....	One decillionth.

Here is a tabular view of the doses of some substances employed by the homœopathists:—

Charcoal,.....	One or two decillionths of a grain.
Camomile,.....	Two quadrillionths of a grain.
Nutmeg,.....	Two millionths of a grain.
Tartar emetic,.....	Two billionths of a grain.
Opium,.....	Two decillionths of a drop of spirituous solution.
Arsenious acid,.....	One or two decillionths of a grain.
Ipecacuanha,	One or two millionths of a grain.

These doses are given in pills (globules), each about the size of a poppy seed.

Of course, these doses are perfectly inert, and a person treated homœopathetically is, in fact, left entirely to nature. The homœopathists, however, maintain that these remedies have a wonderful potency; and their founder even went so far as to account for the supposed increased efficacy of the small doses. It was the rubbing and shaking, he said, that did it. "I have been forced by experience," he says, "to reduce the number of shakes to two, of which I formerly prescribed ten to each dilution." "A drop of dosera, in the thirtieth degree of dilution, at each of which it has been shaken twenty times, endangered the life of an infant who took it for whooping-cough, whilst one to which only twelve shakes had been given at each was sufficient, with a grain of poppy with which it was combined, to produce a prompt and easy cure."

One would imagine that, as the homœopathists believe that the efficacy of medicine so much depends upon its degree of dilution, they would often be at a great loss what particular dilution to fix upon. Such, however, is not the case. One of their writers, Dr. Black, observes—"What dilution should be administered is a question still in a measure *sub judice*, and which has given rise to many an unseemly discussion, the acrimony of which would lead us to suppose that it was a vital point in homœopathy, and that the selection of the dose, instead of being subordinate, was paramount in importance to that of the remedy. One party have maintained that the high dilutions—for example, thirty—are the best in all cases. Another party have considered the lowest only as serviceable, and that the practice of the former was nothing better than a 'medicine expectante.' The discrepancy of two such opposite opinions may be partly explained by the circumstance, that the former class have had generally chronic diseases to treat, the latter acute; and also that, in a number of cases where the medicine is well chosen, the difference of dilution is really imperceptible, and that the thirtieth dilution succeeds as well as the third."

We believe that the last remark of this quotation is perfectly correct.

"Strange that such difference should be
'Twixt tweedle-dum and tweedle-dee."

Dr. Wood has, in his admirable work entitled "Homœopathy Unmasked," made some very excellent remarks upon the quotation we have given from Dr. Black, which, as illustrative of the folly of the whole affair, we extract:—

"In this sentence (the quotation we have given), the whole question of the small dose system is virtually abandoned; for if the thirtieth dilution (one decillionth) succeeds as well as the third (one millionth), it is plain that neither can have any effect at all. For what does such an assertion amount to? An absurdity so gross that language fails to express it. It is to assert, that if a medicinal substance be divided, not into nine million separate atoms, but into atoms nine million separate times; that is to say, that if the substance be divided into a million of parts, and one of these divided into a million again, and one of the last millions divided into a million again, and so on till the process of division by a million has been repeated nine times, that one of the atoms resulting from the last division will cure disease as readily as the original atom before the division was practised at all. To give a faint idea of the monstrous absurdity which such a statement involves, we may add that the proportion between the thirtieth and the third dilution somewhat corresponds to a drop and 25,834,986,772,486,772,486,772,486,772,486,772,486,772,486 hogsheads of any fluid. Equally rational would it be to assert, that a drop of wine was as potent in its influence as 12,917,493,386,243,386,243,386,243,386,243,386,243,386,243,386,243 pipes of the same fluid; which is to state, that one drop divided among all the inhabitants of the globe would produce in them as astounding an effect as if each mortal were to swallow for his individual share 30,755,936,633,913,062,472,348,298,538,674,729,150,919 gallons, the population being estimated at 840 millions.

"But with regard to this last illustration, the homœopathists, anticipating, doubtless, the universal denial, from experience, of their principle, if applied to our best known and simplest stimulants—wine and ardent spirits—compassionately suffer us to retain our prejudices regarding these, and still to believe that their healing and stimulating properties are not increased by even any quantity of water which may be added. '*Le vin et l'alcool les plus simples de tous les excitans sont les seuls dont l'effet échauffant et irritant diminue quand on les étend de beaucoup d'eau.*'—Dr. Hahneman. Surely this madness savours of method.

"Of such minute division no language can give even the slightest idea; and though calculations may express it in figures, yet they fail to convey any mental conception of its amount.

"A billion of moments have not yet elapsed since the creation of the world, and to produce a decillion, that number must be multiplied by a million seven separate times.

"The distance between the earth and the sun is ninety-five millions of miles; twenty of the homœopathic globules laid side by side extend to about an

What are the symptoms, then, produced by salt? Among them are—palsies; great wasting of the body; eruptions on the skin, with lacerating pains; continual shivering; yellow colour of the skin; melancholy sadness, with abundant weeping; hatred of those from whom injuries have long ago been received; irascibility and violent rages, easily provoked; desire to laugh; weakness of the memory, and excessive forgetfulness; the experimenter blunders in speaking and writing; falling out of the hair, even of the beard; repugnance for tobacco smoke; and many others equally probable, and equally well ascertained.

Common nutmeg is a substance most of us have tasted—what symptoms does it give rise to? Why, among others, great painful sensibility of the whole body, agitation of the muscular system, malignant fever, bloody sweat, idiocy and madness, shortness of breath, contraction of the throat as if from suffocation, a constant flow of facetious ideas, with a strong disposition to make a fool of everybody. Dr. Wood not unnaturally remarks, with regard to this last symptom, that it might be suspected the experimenter made a fool of his master, had it not indeed been already done to his hand.

“We are struck too,” we again quote Dr. Wood, “with the number of cases in which madness was produced (query, preceded?) by the use of the remedies. Aconite produced, as it were, ‘weakness of mind, with impossibility of reflecting, and a sensation as if all the intellectual functions were performed in the precordial regions, and this is followed by insanity and idiocy.’ The next remedy in the list, *Æthusa*, produces ‘mania and furor.’ The next, *Agaricus*, produces ‘a disposition to prestige and to *prophecy*, which is followed by timid mania, or furor, with a great development of strength.’ The next, *Agnus*, produces ‘a melancholy and hypochondriacal state, with apathy, loss of ideas, and incapacity for doing anything; this is followed by excitement, alternating with self-reproach, and ending in complete sadness, and desire for death.’ The next, *Alumina*, produces ‘sadness, a disposition to take everything in bad part, weakness of the memory, and incapacity for following out a single idea.’ The next, *Ambra*, ‘inconsolable sadness, and disgust of life.’ The next, *Ammonium*, ‘loss of memory, with diminution of the intellectual powers.’ The next, *Ammonium muriaticum*, ‘a melancholic state.’ The next, *Anacardium*, ‘a loss of moral sentiment, with an irresistible desire for cursing and swearing, weakness of the mind, and of the memory.’ The next, *Angustura*, ‘extreme mental excitement and gaiety.’ The next, *Antimonium*, ‘mania.’ The next, *Argentum*, ‘stupidity, and a sensation of emptiness about the head.’ The next, *Arena*, ‘absence of ideas, loss of recollection, delirium.’ The next, *Arsenicum*, ‘mania and furor.’ The next, *Assafoetida*, ‘great irritability, with mental indifference for everything.’ We have just taken the first fifteen in their list of remedies, of which the symptoms are given in full by Jahr. We might have done the same with all the rest. Whatever might have been the state of

mind of the experimenters previous to undergoing the homœopathic tortures, it is plain that, on emerging from them, their mental state must have been such as to prevent any dependence whatever being placed upon any assertions they might choose to make."

One more quotation from Dr. Wood, and we have done. "Common charcoal," says this gentleman, "is not regarded by allopathic practitioners as an agent possessing any great power. Burdin gave a pound of it daily without producing any physiological effect, and Hahneman informs us that *physicians* did not believe that it possessed any medicinal properties at all. With admirable naïveté, however, he observes, that it was left for empiricism to discover its virtues; but there was a difference between the empiric discoverer and his homœopathic follower. The one used the wood of the lime tree, the other that of the birch. But did we say that this ingredient is powerless? Impossible. For Hahneman discovered that, by triturating it with a non-medicinal substance, such as sugar of milk, and dosing a healthy person with the decillionth of a grain, he could produce no fewer than 930 distinct symptoms. For a considerable time he gave it in the sextillionth dilution, but long experience (for the remedy seems a favourite) convinced him that the decillionth is the most effective. How dreadful to think of the quantity that must be swallowed by those who brush their teeth with it, and the sufferings to which they must be exposed!

"Before reviewing the effects of this most powerful agent, let us remark—'the drink is to be similar to what the experimenter had been accustomed to,' with a hint, that it 'should be as little stimulant as possible.' We shall find that it is of importance to determine, in this particular case, what was the exact quantity swallowed.

"But inasmuch as there is no precise information on the subject, we might be left to mere conjecture, were it not that we find that one experimenter had before 'suffered from a broken head.' He had found, too, that a *little* wine taken during the experiment had the effect of heating him, and as Hahneman particularly cautions experimenters to avoid this, we presume he took more to counteract its effect on homœopathic principles, for

'Here shallow draughts intoxicate the brain,
So drinking largely sobers it again.'

Be this as it may, the peculiar symptoms of the *medicine* (?) began to be manifest on rising from table, and 'acquired an additional intensity after supper.'"

We shall give a selection from the symptoms, and as Black admits that Hahneman has an awkward trick of not enumerating them in the order in which they are manifested, we shall give them what we think is a more natural arrangement.

Behold our experimenter then. After having taken his prescribed diet, in no insignificant quantity, we presume—for he lays such stress on the moderate proportions of a subsequent meal, that it seems very obvious the thing was of rare occurrence with him—and having finished his labours with his usual allowance of wine, which we have reason to suppose was not out of proportion to his food, and having swallowed in addition (we entreat pardon for leaving it to the last) *the decillionth part of one grain of vegetable charcoal*, his observations are recorded as follows:—

1. "Giddiness, either in walking or in sitting down," then "a loss of sense and memory;" "he falls asleep on his chair," "awakes still giddy, with a trembling of the body, and, on trying to rise, feels as if fainting;" "the slightest movement makes him giddy;" "he tries to walk, but *reels*," and, "at last, he is obliged to go to bed;" when there, however, "he does not sleep, but feels it impossible to open his eyes."

Next morning, "he has a sensation in the mouth and on the tongue, as if he had been drinking much wine the night before;" "in rising from bed, his head is very much carried;" "he has a difficulty in combining his thoughts;" "he is as one awakened from a dream—is obliged to go to bed again;" but remembering the real cause, he confesses "that he has a headache, with stupefaction, *as if after a debauch*;" "he is unable to take breakfast"—"his tongue is white and loaded," "his mouth is dry," "his lips tremble convulsively," "he has a violent beating pain in his head," and "eructations, nausea, and pain in the stomach," with frequent desire to vomit.

So admirable is this description of the experience of a drunkard, that we almost hesitate whether to prefer the confessions of Hahneman's experimenter, or the celebrated sketch of Christopher North. The one might be a translation of the other. In proof of this, we give the annexed comparison:—

DESCRIPTION OF A DRUNKARD, BY CHR. NORTH.

Drunkard, stand forward, that we may draw your picture. There he stands. The mouth of the drunkard, you may observe, contracts a singularly sensitive appearance, seemingly red and rawish.

He is perpetually licking or smacking his lips, as if his palate were dry or adust. His whole being burns for a dram.

What a snout he turns up to the mountain air! inflamed, pimpled, snubby, and snorty, and with a nob at the end on't, like one carved out of a stick by the knife of a schoolboy.

SYMPTOMS PRODUCED BY CHARCOAL, ACCORDING TO HAHNEMAN.

Gonflement de la lèvre supérieure et de la joue, avec douleur convulsive.

Le bout de la langue est chaud et sec. Chaleur dans la bouche et sécheresse. Ardeur en haut dans la gorge. Sensation d'ardeur en arrière et en haut dans la gorge.

Eruption de nombreux boutons à la face. Sur le front çà et là eruption de boutons rouges lisses et indolens. Eruption dans le coin de l'aile du nez.

Croutes au bout du nez.

A perpetual cough harasses, and a perpetual expectoration exhausts him.

How his hand trembles !

It is an effort even to sign his name.

One of his sides is certainly not so sound as the other—there has been a touch of palsy there.

And the next hint will draw down his chin to his collar bone.

And converts him, a month before his dissolution, into a slavering idiot.

There is no occupation, small or great, insignificant or important, to which he can turn, for any length of time, his hand, his heart, or his head.

So much, we should say, for the wine. * * * We are compelled to draw a veil over what follows. Suffice it to say, that the orgies of the night seem to have been not unworthy of the Bacchanalian revelries which ushered them in. Was it wonderful if they should be followed by “bad humour, a kind of oppression,” “an excessive irritability of temper or impatience, or despair”—“a combination strongly savouring of blue devils,” and leading us to believe that the headache was not the only symptom of which it might be said, “comme après l’ivresse.”

These absurdities of homœopathy are amusing enough ; but it is melancholy to think of the great amount of both mortality and suffering this pretended science has caused since its first promulgation. The dreadful symptoms which the homœopathist believes, or pretends to believe, to be caused by their remedies, of course, do not occur ; but the evil is that a patient, particularly when labouring under acute disease, is deprived of that undoubted relief which, in the majority of cases, regular medicine can afford. It is to be hoped, however, that the days of homœopathy, in this country at least, are numbered.

The cures that take place in patients, under homœopathic or other quack treatment, are in no case to be ascribed to the remedies employed. All their pretended cures can be understood, if we consider the natural tendency of all disease to run on to a favourable termination, and the favourable influence of hope, &c., upon the imagination. Some diseases, which are undoubtedly, and, in general, fatal—as severe inflammations—unless properly treated, have been stated to have been cured by homœopathic practice. Experience, however, has unfortunately shown, that sometimes from fraud, sometimes from

Prurit dans le larynx qui excite à tousser avec expectoration visqueuse salée. Crachats muqueux tirés du larynx par un toux brève.

Sensation dans les mains comme si la force musculaire y était affaiblie.

On écrit lentement et avec difficulté.

Tressaillement musculaire dans le côté gauche.

Faiblesse comme paralytique de l’épaule et du bras droit.

Douleur spasmodique à la mâchoire inférieure. Douleurs déchirantes dans les muscles du côté gauche de la nuque.

Augmentation de la sécrétion saliveuse. Manque subit de mémoire ; on ne se souvient pas de ce qu’on vient de dire ou d’entendre. Difficulté de parler comme si on avait de la peine à remuer la langue.

Paresse, somnolence, inaptitude à tout. Inaptitude aux efforts corporels. Paresse d’esprit ; inaptitude à penser.

ignorance and enthusiasm, the homœopathic reports of cases are not to be trusted. Slight diseases are called by the names of severe ones, and recoveries put down which never occurred. For instances of this, we refer to Dr. Wood's little book.

This latter remark is even more true of the hydropathists, a sect of medical quacks who need not detain us a moment. They believe, if indeed they know what they believe, that all disease is owing to the presence in the body of some morbid matter, which can be driven out by water—by causing perspiration from drinking it, bathing in it, or being wrapt up in wet clothes, &c. This is pure nonsense; and their practices, besides being absurd, are nauseous and disgusting. Applied, too, in some diseases, as gout, skin diseases, they are very dangerous by causing metastasis. Probably some distinguished or well-known person will be obviously and clearly murdered by hydropathy, and then the mischief will be dishd up.

APPENDIX.

SECTION FIRST.

POISONS.

A GREAT number of substances occasionally destroy life, either by being taken accidentally, or for the purpose of suicide, or administered by others to produce death. It is impossible in this place to notice all these. We will confine our remarks to sulphuric acid, oxalic acid, arsenic, corrosive sublimate, opium, nux vomica, prussic acid, and poisonous mushrooms.

The appearances of sulphuric acid have been before alluded to. It is occasionally employed in this country for the purpose of suicide, and it also every now and then causes death by being taken by accident. From its powerful taste and acrid qualities, it can scarcely be employed as a poison by the murderer. It has, nevertheless, been, upon one or two occasions, poured down the throat of intoxicated people, and there have been several instances in this country of children being murdered in this cruel and barbarous manner.

A new crime has, within the last twenty or thirty years, arisen, in which sulphuric acid is employed. We refer to the disfiguring the countenance by squirting the acid upon it. Readers of modern romance will remember some frightful allusions to this in one of the most popular of Sue's works. Unfortunately, the abominable practice is not confined to fiction. Several instances of it have occurred, and the Lord Advocate of Scotland was compelled to get a clause added to the "Stabbing and Maiming Act," rendering this crime capital.

Sulphuric acid may destroy life before it reaches the stomach, by exciting inflammation of the glottis, and thus causing death in the way of asphyxia. Ordinarily, however, it reaches the stomach, and the fatal event is to be attributed to its effects there. Generally it excites the most violent inflammation, distinguished from ordinary inflammation of this part by the most excruciating pain, or rather torture. There is, too, a sensation of much burning in the throat. The lips are shrivelled and brown, often with little excoriations or blisters; the inside of the mouth is shrivelled and white; and the teeth become loose, and usually

of a brown colour. There is much vomiting, first of a brown acid fluid, and afterwards shreds of membrane, which are sometimes the disorganized coats of the stomach. From the inflammatory swelling of the pharynx, swallowing is sometimes impossible. The circulation soon fails, and death eventually takes place by syncope. Occasionally the stomach is perforated, and then peritonitis is excited. Death has been known to take place within two hours after the acid has been taken; and, on the other hand, life has been known to have been prolonged for fifteen days.

The proper treatment consists, if the individual be seen soon after the poison has been swallowed, in administering chemical antidotes, which are, of course, the alkalies. Chalk or magnesia are the best. When they are given, the poisonous sulphuric acid is converted either into sulphate of lime or Epsom salts. If these are not at hand, the lime of the plaster of the wall may be beat down, and made into a thin paste with water and swallowed, or a solution of soap may be used. Mild stimulant drinks should also be immediately given to dilute the acid. Unfortunately, however, the mischief done to the coats of the stomach is generally almost instantaneous, and our antidotes are not of much avail. The treatment of the subsequent inflammation differs in nothing from that of common mucous intestinal inflammation.

When, from the moral evidence, symptoms, and morbid appearances, it is suspected that death has taken place from sulphuric acid, it is often desirable to confirm the opinion by the aid of the chemist. Sulphuric acid can be detected in the contents of the stomach, the matter vomited, and in stains upon clothes. First, its acid nature is determined by touching litmus paper with it, which it immediately renders. Then a little nitric acid is added to the dilute mixture of the suspected matter, and next a solution of nitrate of baryta. If sulphuric acid be present, a heavy white precipitate falls down, which can be nothing else than sulphate of baryta, because no acid but sulphuric acid forms with baryta a white precipitate, which is insoluble in nitric acid.

Poisoning by oxalic acid is almost peculiar to this country, where, unfortunately, it is anything but of unfrequent occurrence. It has only, however, here been used either designedly, or by mistake, as a poison since 1814, when Mr. Rayston pointed out that it might be mistaken for Epsom salts. By a most extraordinary fatality, the mistake has become much more frequent since people were put upon their guard against it. It is very rarely administered by the murderer, on account of the rapidity of its operation rendering its discovery almost certain. It is often used for the purpose of suicide.

When oxalic acid is injected into the stomach of a dog or cat, it gives rise to pain, as expressed by cries and struggles. In a few minutes this is succeeded by efforts to vomit; and this again by dulness, languor, and death without a struggle, which, if the dose is large, sometimes happens in two minutes. When

diluted, if used in large quantities, it appears to produce paralysis of the heart, while, in less quantities, it would seem to act upon the brain, and bring on coma. In man, however, there is always evidence of a depressing effect upon the circulation.

When taken for the purpose of suicide, it has been known to prove fatal in ten minutes; and the general rule is, that the unfortunate person dies within the hour.

Upon examining the body after death, marks of inflammation, or rather irritation, are sometimes found in the stomach, but sometimes they are absent.

The treatment of poisoning with oxalic acid is not satisfactory. Oxalate of magnesia is not an active preparation, and therefore, if there be time, magnesia may be given as an antidote. In other respects, the treatment must depend upon the symptoms present.

The chemical tests of oxalic acid are muriate of lime, nitrate of silver, and sulphate of copper, which cause characteristic precipitates of oxalate of lime, silver, and copper.

It is proper to remember, that oxalate of potash, commonly termed essential salts of lemons, is as powerful a poison as pure oxalic acid. A dose of it has been known to produce death in ten minutes.

White arsenic, or arsenious acid, is often used both by the suicide and the murderer. Probably, in this country, the coroners have every year to investigate into the particulars of upwards of a hundred deaths from this cause. The reason that this particular poison is selected is, perhaps, owing to the fact, that it is also much employed by farmers for poisoning rats and other vermin, and that there is no prohibition of its being sold by even the most ignorant shopkeeper. No poison has, perhaps, received so much of the attention of toxicologists.

Arsenic has got no taste, or, if any, a feebly faintish one. Hence it may be fraudulently administered among articles of food.

Arsenic has a twofold action: it acts as an irritant upon the stomach, exciting inflammation there, and it also has a remote action upon the nervous system. It is supposed that four grains are sufficient to cause death.

"The symptoms of poisoning by arsenic may be considered," says Dr. Christison, "under three heads. In one set of cases, there is every sign of violent inflammation of the alimentary canal, accompanied, as indeed always happens in such a condition, with much debility, but there is no disorder of the nervous system. These cases generally prove fatal, and the fatal event happens in from one to three days. In another class of cases, there is little sign of irritation in any part of the alimentary canal, but the prominent symptom is extreme prostration of strength, and in these cases death is seldom delayed beyond the fifth or sixth hour. In a third set of cases, the inflamma-

tory symptoms pass off to a greater or less extent, and they are followed or accompanied by disorders of the nervous system, such as palsy or epilepsy. In these, life is prolonged for a week, and sometimes much longer.

In the first class of cases, distinguished by marks of strong intestinal irritation, which are the most frequent of all, the first symptom is sickness or faintness. In general, these are not observed until half an hour after the poison has been taken. Next, the region of the stomach feels painful, the pain being of a burning kind, and much aggravated by pressure. There is a sense of heat and dryness about the throat, creating an incessant desire for drink. About this time violent vomiting comes on, the matter thrown up being generally of a greenish yellow colour. This, in no long time, is accompanied by diarrhoea. The pulse, from an early stage, is very small, and often is imperceptible. Clammy perspirations cover the countenance, which pretty uniformly wears an expression of great torture and anxiety; the eyes are red, sparkling, and staring, and, as the case approaches to a fatal termination, there is sometimes delirium. Death, in general, comes on calmly, but is sometimes preceded by a paroxysm of convulsions.

In the second class of cases, in which death takes place before the inflammation has had time to develop itself, the symptoms are by no means so well marked. Sometimes there are one or two fits of vomiting, and some trifling pain at the epigastrium; but the characteristic symptom is extreme faintness, occasionally accompanied by stupor. This variety of poisoning has been principally observed when the dose has been very large. It is not of common occurrence. One of the most extraordinary instances of it has been related by Orfila. A man swallowed three drachms of arsenic at eight o'clock in the morning, and went about for two hours bidding adieu to his friends, and telling them what he had done. He was then prevailed upon to take emetics and diluents. These caused free vomiting. He suffered very little until one, when he became affected with a constricting pain in the stomach, cold sweats, and feeble pulse. At five he died.

The third variety of arsenical poisoning, is chiefly seen in those persons who, having originally taken only a small dose, or who, having vomited soon after taking it, eventually recover. Most commonly, symptoms of inflammation first appear, and upon their subsidence, the nervous disorders are witnessed. These are various in different individuals. The most formidable is perfect coma; the most unimportant, slight palsy of the arms or legs; and intermediate between the two, are epilepsy, or tetanic attacks, and affections of a hysterical or maniacal nature.

Dr. Christison quotes an instance of epilepsy brought on by arsenic. A girl swallowed a drachm of this poison, and was attacked with the usual symptoms of irritation of the whole alimentary canal. She remained in this state for four-

and-twenty hours, when she experienced some remissions, and got some repose. In twelve hours more she began to improve rapidly, the pain subsided, her strength returned, and the stomach became capable of retaining liquids. Towards the close of the second day, she was harassed with frightful dreams, starting from sleep, and tendency to faint; and next morning she complained of coldness along the spine, giddiness, and intolerance of light. On the fourth day her extremities ached, and her skin tingled. These symptoms of disorder of the nervous system continued until the sixth day, when she was suddenly seized with convulsions of the left side, foaming at the mouth, and complete insensibility, which latter lasted all night, but the convulsions ceased in two hours. Next evening she had a similar attack. Three days afterwards she had another but slighter fit, and similar ones returned occasionally for more than a week. Eventually she quite recovered.

The same author also describes a case of poisoning with arsenic, distinguished by palsy, as one of the symptoms. Four persons were simultaneously affected an hour after breakfast with the inflammatory symptoms of poisoning by arsenic. In all of them there was excessive muscular debility, and in two of the four, true partial palsy came on. One lost altogether the power of his left arm, and the other had long-continued numbness, pain, and debility in his legs.

Besides these affections of the nervous system, other chronic diseases have been supposed to follow the use of arsenic in a large dose. The accuracy of some of the statements made upon this head may, however, be doubted.

Indeed the whole subject of poisoning has only been at all well understood within the last fifty years. The most absurd opinions were formerly entertained with regard, for instance, to secret poisoning. It was thought that certain slow poisons existed, capable of exciting death at any given but distant time, according to the will of the poisoner. It is needless to remark, that the reputation of the secret poisoners of the fifteenth, sixteenth, and seventeenth centuries, depended not upon their own skill, but upon the ignorance of the profession, and the credulity of the public. The history of many of these secret poisoners has recently been written. Few of our readers have not, while they execrated the crimes, deplored the fate of the Marchioness of Brinvalliers. Another woman, Tofana, an Italian poisoner, actually confessed that she had murdered six hundred individuals. The poison which she used, Aqua Tofana, as it was called, and which was the dread of every noble family in the south of Europe, is supposed to have owed its properties to arsenic. It therefore claims here a passing notice. This infamous woman lived at Naples about two centuries ago. The manner of her detection exhibits the state of Italian society at that period in anything but a favourable light. It was observed in Rome, during the pontificate of Alexander the Seventh, that a number of young wives became widows,—that

many husbands who were not on good terms with their wives died suddenly. To such an extent did this prevail, that the police took up the matter, and an old woman called Spara, a fortune-teller, and who had very accurately foretold the death of many of the recent deceases, was suspected. By the ingenuity of a woman, Spara's guilt was made manifest, and she was executed. It appeared that she obtained the poison from Tofana. Tofana herself afterwards fell into the hands of justice. Garelli, the physician to Charles the Sixth of Austria, at the time of these poisonings, was governor of Naples, and states that the poison was arsenic dissolved in aqua cymbalariae. The mixture was colourless, tasteless, inodorous, just like water. The dose was said to be from four to six drops.

In all probability this poison was daily administered, but we unfortunately possess no accurate account of the symptoms produced by it. The following we copy from Dr. Christison, who found it in an old German magazine :—"A certain indescribable change is felt in the whole body, which leads the person to complain to his physician. The physician examines and reflects, but finds no symptom, either external or internal; no constipation, no vomiting, no inflammation, no fever. In short, he can only advise patience, strict regimen, and laxatives. The malady, however, creeps on, and the physician is sent for again. Still he cannot detect any symptom of note. He infers that there is some stagnation or corruption of the humours, and again advises laxatives. Meanwhile the poison takes firmer hold of the system; languor, wearisomeness, and loathing of food continues; the nobler organs gradually become torpid, and the lungs, in particular, at length begin to suffer. In a word, the malady is from the first incurable; the unhappy victim pines away insensibly even in the hands of the physician; and thus he is brought to a miserable end, through months or years, according to his enemy's desire." This account is neither clear nor satisfactory, but there is, notwithstanding, little doubt that this drug was used long, and to a frightful extent, as a secret poison.

The morbid appearances found in the bodies of those who have died from the effects of arsenic are various. Sometimes, indeed, there are none at all; and this, as we might suppose, is the case when death takes place very soon after the poison is taken, and from the depressing effect which it has upon the heart. Generally, however, the lining membrane of the stomach and intestinal canal exhibit marks of the various degrees of inflammation, varying from congestion to the slough of mortification. Sometimes there are distinct ulcers. A very common appearance, too, is the presence of a sanguinolent fluid in the stomach. And sometimes arsenic itself will be found sticking to the coats of the stomach and intestinal canal. Occasionally, the arsenic meets with sulphur in the stomach, and is converted into the yellow sulphuret of arsenic. It is a common but erroneous opinion, that the bodies of those who have died from arsenical, or

indeed from any kind of poisoning, rapidly putrefy. On the contrary, many are now of opinion that arsenic has an antiseptic property.

All the compounds of arsenic are soluble in the juices of the stomach; and therefore, although many have been suggested, we possess no effectual antidote. One, however, has of late years been introduced—the hydrated peroxide of iron. Many are of opinion that this substance is an effectual remedy for arsenical poisoning, but it is probable that, as a chemical remedy, this medicine is not of much efficacy. It has sometimes, however, appeared to be serviceable, but probably it acts mechanically, by enveloping the coarser particles of arsenic with its fine impalpable and adhesive powder. Two other supposed antidotes, probably, have a similar action—magnesia and charcoal. It is certain, at least, that neither of these act chemically with arsenic, and yet, in some cases, they have seemed to be useful.

It is not to be supposed, however, that because we possess no antidote for arsenic, medical treatment is unavailing in cases of poisoning with this substance. If vomiting, as often happens, be delayed for half an hour, or more, an emetic of sulphate of zinc should be administered, and milk should be drunk both before and after the vomiting, as it would appear to be the best substance for enveloping the powder, and thus facilitating its discharge from the stomach. After the poison has been removed from the stomach, the inflammation and sinking have to be treated according to general principles—sometimes by blood-letting; at others, by stimulants; and often, in combination with either, by opium.

The discovery of the presence of arsenic in the bodies of those who have died from its effects, is the perfection of toxicological chemistry. We shall here rapidly describe the chemical tests for the substance in question. When arsenic occurs in the solid form, the best manner of being certain that it really is arsenic, is by reducing it to the metallic state. This is done by heating it, along with a little charcoal, in a glass tube, to the upper part of which the metallic arsenic is sublimed. The metallic crust so formed, has physical properties which distinguish it from all other substances. The outer surface is like polished steel, and the inner surface either brightly crystalline to the naked eye, or it has a dull, greyish-white colour, but appears crystalline if viewed through an ordinary magnifying lens. In this manner the hundredth part of a grain may be detected, or even a still more minute quantity.

The tests for arsenic, in a state of solution, are—to throw it into a solid state, by the addition of sulphuretted hydrogen gas, and then to test it in the manner just described; to drop into the suspected fluid ammoniacal nitrate of silver, when, if arsenic be present, a lemon-coloured precipitate is thrown down; or to use, in the same manner, ammoniacal sulphate of copper, which causes a green precipitate. Any one desirous of knowing other tests for arsenic, as well

as the manner in which they should be applied to the contents of the stomach, &c., will find full information in Dr. Christison's standard work upon poisons.

Corrosive sublimate is a virulent poison, occasionally employed by the murderer and suicide. We may describe the symptoms which it excites in man under three heads. First, when a large dose is taken, and the person dies soon; secondly, when some important secondary inflammatory symptoms come on; and, thirdly, when, instead of symptoms of an inflammatory, we have those of a nervous nature.

Taken in a large dose, corrosive sublimate produces symptoms very similar to those of arsenical poisoning—vomiting, pain in the stomach, and diarrhoea. There are, however, some important differences to be observed. In the first place, the taste of the sublimate is so strong and horrible, that no one could swallow it, like arsenic, unawares. Then the symptoms begin much sooner. The irritation in the throat commences often in the act of swallowing, and that in the stomach may begin immediately, or within five minutes, after the sublimate is taken; and the sense of acridity, both of the gullet and inside, is felt to be greater than that produced by arsenic. Sometimes, the swelling of the throat is so great, that it is impossible to speak. One case is on record, in which the sufferer, a young woman, attempted to poison herself with two drachms of sublimate in the solid state, and who was actually unable to force it down, on account of the constriction it excited in the throat. The ordinary duration of a fatal case, is from twenty-four to thirty-six hours.

The morbid appearances found in the bodies of those poisoned with corrosive sublimate, resemble those witnessed in the stomach and intestines of individuals who have died from arsenical poisoning.

The second variety of symptoms of poisoning by corrosive sublimate, comes on when the inflammation of the stomach is past; or when only a small dose has been given, and no stomachic inflammation has existed; or when a large dose of any other compound of mercury has been given; or when repeated small doses of any compound of mercury have been administered. In all these cases, the leading affection is inflammation of the organs about the mouth, particularly of the salivary glands. To this affection the name of salivation is ordinarily given. It usually commences with a metallic taste in the mouth; the gums are next observed to be sore, spongy, and tender; afterwards they ulcerate; the breath has got a particularly fetid smell. Next there is an increased flow of saliva, and the face begins to swell. Along with this, constitutional fever is set up. In bad cases, the inflammation and swelling of all the parts about the mouth increases; gangrene comes on, and the patient sinks, either from exhaustion, gangrene, or suffocation from the swelling of the tongue and throat, and sometimes from hemorrhage from the sloughs extending to the carotids.

The third set of symptoms may be produced by the gradual absorption into the system of any salt of mercury, and has been principally observed in the workers of quicksilver mines, gilders, and others, whose occupation brings them into frequent contact with mercurial preparations. The disease so produced commences slowly. Its first symptom is unsteadiness of the arms, then quivering, and finally tremors, which gradually increase until they become convulsions, and so violent as to render it impossible for the patient to walk or even to speak. All attempts at voluntary motion are effected by jerks and sudden starts. Should the man not leave his work, the nervous system becomes more deeply implicated, and death, by the way of coma, comes on. If, however, people so affected are removed from the exciting cause, and put under proper treatment, recovery soon takes place.

Besides these injurious effects, excited in the human system by the compounds of mercury, there is scarcely a disease in the nosology which they cannot excite, if the predisposition to it exists.

The treatment for poisoning with corrosive sublimate, when a considerable quantity has been taken at once, and symptoms of gastric inflammation are either present or to be expected, is clear enough. Fortunately, we possess an antidote for it—albumen, of which the white of egg affords an example—almost always at hand. Corrosive sublimate is a bichloride of mercury, and the albumen converts it into the comparatively innocuous chloride. This important fact was discovered by Orfila. It was first tried upon animals, and with perfect success; and it was afterwards employed in cases of poisoning in man with the same happy result. One of the opportunities of trying it was singular. M. Thénard, the celebrated French chemist, was in the habit, when lecturing to his class, of sipping some water from a glass placed by his side. One day he inadvertently swallowed, instead of water, a concentrated solution of corrosive sublimate. He immediately perceived the fatal error which he had committed. Some of his pupils ran for a supply of eggs, which were fortunately procured in five minutes. He suffered no material harm, although there is no doubt but that he would have died, had it not been for the prompt use of the albumen.

The gluten of wheat, or vegetable albumen, is equally efficacious as an antidote for corrosive sublimate; and if these cannot be procured, milk is a convenient antidote of the same kind.

The treatment of the inflammation, when once set up, differs in nothing from that produced by arsenic.

Salivation, attended with active inflammatory fever, requires bloodletting, and saline purgatives, and always a cool, pure air. If there is a tendency to gangrene, stimulants will of course be requisite. Towards the close of a moderate salivation, some slightly stimulating gargle is often useful, both in relieving the uneasy sensations of the gums and mouth, and also in restoring the parts

to their natural state and action. A common prescription of this kind is a weak mixture of brandy and water; but a still more efficacious one is a solution of chloride of lime in water, in the proportion of from one to four grains of the chloride to the ounce of water.

The principal treatment of mercurial palsy, is simply removal from the exciting cause.

By far the greater number of deaths by poison are those caused by opium. Probably, in England, one hundred cases of poisoning by opium occur each year. It is used by the timid to accomplish self-destruction, as its effects are not productive of pain. It has also been employed to effect murder, and to induce stupor, in order that robbery may be committed without fear of detection. Its frequent employment in medicine, too, leads to accidents, which occasionally prove fatal.

The symptoms of poisoning by opium are, first, giddiness and stupor. This stupor goes on rapidly increasing, until the poisoned person becomes quite motionless and insensible to external impressions. Then a complete state of coma is set up. The breathing is slow, laboured, and stertorous, owing to the poisoned medulla oblongata being no longer fully cognizant of the necessity for inspiration; the eyes are shut, and the pupils are contracted, and the countenance has an expression of deep and placid repose. As the poisoning advances, the countenance becomes ghastly, the pulse imperceptible, and at last death, by pure coma, takes place. Should assistance be rendered, and the poisoned man recover, the stupor is succeeded by prolonged sleep, which lasts from twenty-four to thirty-six hours; and this is followed by nausea, loathing of food, &c.

The usual duration of a case of poisoning by opium, is from seven to twelve hours. Those who outlive twelve hours usually recover.

The morbid appearances generally found in the body, in poisoning by opium, are—turgescence of the vessels of the brain, serous effusion into the ventricles, lividity of the skin, fluidity of the blood, and a tendency of the dead body to pass rapidly into putrefaction.

The treatment of poisoning by opium is well understood, and, if the case be seen at an early period, commonly successful. The first thing is to remove the poison from the stomach. To effect this, we at first employ emetics, of which the sulphate of zinc is the most preferable. Sometimes, however, the poison so destroys the irritability of the stomach, that the emetic has no effect upon it. In this case we use the stomach-pump. The originator of this little instrument was probably Dr. Monro, but it was first actually employed, in a case of poisoning, by Dr. Physick, an American physician. The principle of the stomach-pump is to introduce a tube into the stomach, at the outer end of which are two little pumps. One of these forces water into the stomach, the other pumps it out. This operation is continued until the fluid brought up from the stomach

is pure water. When the stomach-pump is not at hand, its want may be effectually supplied by any elastic tube which can pass down the œsophagus. By introducing such into the stomach, filling it with water from a jug, and then turning the free end down, and making the man's head lie lower than his stomach, the whole contents of this viscus, by the mere force of gravity, rapidly flow out. Should it be impossible, as may from circumstances happen, to evacuate the stomach, either by the administration of emetics or the stomach-pump, we are not without resource. The injection of a grain of tartar emetic into a vein is pretty sure to induce speedy vomiting.

After having got the poison out of the stomach, the next object is to keep the patient constantly roused. The best means of effecting this is to drag him up and down between two stout men; or for four men, standing at each corner of a square, to rapidly pitch the patient from one to another. The men must be cautioned not to yield to the entreaties or struggles of the patient to be allowed to rest for a little, for the stupor is apt to return upon the slightest intermission of the motion. This must be continued, as the case may require, to from three to twelve hours. When the stupor appears to be got rid of, the patient must then be allowed to take out his sleep in bed, but he must be carefully watched, to be sure that no signs of coma are coming on, and roused from time to time. If such signs do threaten, or the difficulty of rousing him be great, he must be turned out of bed, and exercised as before.

As an adjunct to the motion, we may, to keep the patient roused, dash water upon him, make him drink strong tea, or we may pull his hair, inject water into his ears, or make use of other similar torments. These latter, however, should be confined solely to cases where the poisoning has been accidental. No reasonable man, in danger of dying from the accidental swallowing of laudanum or opium, will be angry that such measures have been taken with him. But with the suicide the case is different. When he took the poison, he was probably in a disheartened and disconsolate mood, which we should be careful not to perpetuate. All our treatment of him should be as kind and gentle as is consistent with his safety.

The contents of the stomach, or the vomited matter, are ascertained to have contained opium, by adopting the usual plan of separating morphia from that substance, and ascertaining if the substance so obtained possesses the chemical qualities of this alkaloid.

We include, in our short list of poisons, *nux vomica*, not that it is, by any means, commonly used to destroy life, but because it is an instance of a poison which produces death by asphyxia. We shall merely quote the following graphic account of a case of poisoning by this substance. The case is reported by Mr. Ollier, but we extract Mr. Pareira's version of it:—

“A young woman swallowed between three or four drachms of this sub-

stance in powder, and in half an hour was seen by Mr. Ollier. She was sitting by the fire, quite collected and tranquil, her pulse about eighty, and regular. He left her for about ten minutes to procure an emetic, and on his return found that she had thrown herself back in her chair, and that her legs were extended, and considerably separated. She was perfectly sensible, and without pain, but seemed in alarm, laid hold of her husband's coat, and entreated him not to leave her. A perspiration had broken out upon her skin, her pulse had become faint and much quicker, and she called frequently for drink. She had then a slight and transient convulsion. Recovering from it, she was in great trepidation, kept fast her hold of her husband, and refused to let him go, even for the alleged purpose of getting her drink. In a few minutes after, she had another and more violent attack, and shortly afterwards a third. The duration of these was from a minute and a half to two minutes. In them she retained her grasp, her whole body was straightened and stiffened, the legs pushed out, and forced apart. I could not (says Mr. Ollier) perceive either pulsation or respiration. The face and hands were livid, the muscles of the former, especially of the lips, violently agitated, and she made constantly a moaning, chattering noise. She was not unlike one in an epileptic fit, but did not struggle, though, as she was forced out, it was very difficult to keep her from falling on the floor.

"In the short interval of these attacks she was quite sensible, was tormented with incessant thirst, had a very quick and faint pulse, complained of being sick, and made many attempts to vomit (she had swallowed some ipecacuanha powder, to evacuate the stomach); she continued to refuse to let her husband move; and to the question, whether she was in pain? replied, 'No, no, no.'

"A fourth and most vehement attack soon followed, in which the whole body was extended to the utmost, and she was rigidly stiff from head to foot, inasmuch that, with all the force of the surgeon, he could not bend her thighs or the pelvis, to replace her in her seat. From this she never recovered. She fell into a state of asphyxia, and never breathed again. She now relaxed her grasp; her discoloured hands dropped upon her knees; her face, too, was livid; the brows contracted; the lips wide apart, showing the whole of the closed teeth; and a salivary foam issued plentifully from the corners of her mouth. The expression of the whole countenance was at this time very frightful. She died in about an hour after taking the poison. Five hours afterwards, she was still as straight and stiff as a statue. If you lifted one of her hands, the whole body moved with it; but the face had become pale in comparison, and its expression more placid."

Since the discovery of hydrocyanic or prussic acid, it has been too extensively used for the purposes of self-destruction, and also, we regret to say, at least in one instance, by an educated man, for the purpose of murder. The quickness and certainty of its action have probably been the cause of its selec-

tion. Taken or administered in a large dose, death takes place suddenly and immediately—probably sometimes in a few seconds, and without any convulsions. In a somewhat smaller dose, more or less of convulsion is generally observed. The following case, related by Mr. Taylor, is a good instance of the first of these actions. A surgeon swallowed seven drachms of the common prussic acid of the shops (which only contains two per cent. of strong prussic acid). He survived four or five minutes, but was quite insensible when he was discovered, about two minutes after swallowing the poison. He was found lying senseless upon the floor of the landing. He had swallowed the poison while ascending the stairs. No convulsion of his limbs or trunk were observed, but there was some feeble flickering about his lips. He seemed to cease to breathe for a few seconds, and then the function was performed in fits, the act of expiration being observed to be remarkably deep and prolonged. The following case is related by Dr. Christison, and is an example of death from prussic acid, in which convulsive movements were remarked. A man, apprehended for theft, swallowed a quantity of prussic acid. He immediately staggered a few steps, and then sank down apparently lifeless, and without a groan. A physician saw him immediately, and found his pulse gone, and his breathing for some little time imperceptible. After a short interval, he made an expiration so forcible, that the ribs seemed almost drawn in to the spine. His legs and arms then became cold, his eyes prominent, glistening, and insensible. One or two more convulsive expirations were made, and then he expired, about five minutes after taking the poison.

The following case is abstracted from Dr. Geoghegan, and is one in which recovery from poisoning by prussic acid took place. A gentleman, troubled with dyspepsia, attended with pain in the stomach, was advised to take prussic acid. He commenced with a dose of one minim, which he repeated several times the first day he began his new medicine, and without any effect. Irish gentlemen have sometimes strange fancies about medicines, so the next day he took half a drachm, still with no result. On the third and fourth day he took a drachm, still with impunity. The next day he took a drachm and a half, and with no bad result. Emboldened, upon the sixth day he swallowed two drachms. In about two minutes after doing so, he walked a few paces, when he was affected with great confusion, ringing in his ears, and headache. He retraced his steps to a table, upon which he leaned. His thighs, however, became rigid, his eyes were shut, his teeth clenched, and the muscles of his face were convulsed. He fell backwards, but was caught in the arms of a bystander, and placed upon the floor. In this state he remained for three or four minutes, during which time he was violently convulsed. He was made to swallow sal volatile, and to smell the sesquicarbonate of ammonia. Sensibility

then returned, when he vomited. This gave him great relief, and he was soon quite well. Singularly enough, his stomach complaint was cured.

It is to be remembered, that preparations of bitter almonds, almond oil, and other similar substances used in confectionary and cookery, are equally poisonous with the prussic acid of the shops.

The treatment of poisoning by prussic acid consists in the prompt administration of diffusible stimulants, particularly ammonia.

We detect prussic acid in the contents of the stomach of those who have died from its effects, by distilling them, and to the distilled liquor applying the usual tests for the substance in question.

Serious and sometimes fatal accidents occur occasionally in this country, from the use of poisonous mushrooms, or fungi, and they are still more common in France. Sometimes this arises from making use of an improper species, different from the edible ones; but the edible mushrooms, to some people, act always as poisons, and there is reason to believe that the best mushrooms, if taken in considerable quantity for any length of time, induce a habit of body which may be pronounced a poisoned one.

Upon what their poisonous properties depend is not known. Perhaps they contain more than one injurious matter. At any rate, they sometimes act like narcotics, producing comatose and other affections of the nervous system, and at other times their action is of an irritant nature, more approaching that of arsenic. The following case is an instance of the former mode of action. A man gathered in Hyde Park a quantity of fungi, which he erroneously believed to be specimens of the edible mushroom. He went home, cooked, and proceeded to eat them. He had not completed his repast—and, indeed, it was not more than ten minutes since he had begun—when he was attacked with giddiness, dimness of vision, debility, weakness, and loss of recollection. In a little he somewhat recovered, and started off to seek for assistance. He had hardly proceeded two hundred and fifty yards, when his memory again failed him, and he lost his way. He reeled in his gait, and could scarcely speak. He soon became so drowsy, that it was only by constant dragging that he could be kept awake. Sulphate of zinc was given to him, which made him vomit, after which he grew better.

Sometimes, when a party of three or four have partook of the same mushrooms, half will be afflicted as in the above case, and the other half will have vomiting, diarrhoea, and other symptoms of intestinal irritation.

The treatment consists in administering emetics, and then treating either the narcotism or the irritation, whichever may happen to be present.



AGARICUS SEMIGLOBATUS

GLUTINOUS AGARIC



AMANDA MUSCARIA

FLY AMONITA



AGARICUS BULBOSUS

BULBOUS AGARIC

The first part of the book is devoted to a description of the various forms of the human mind, and to a discussion of the various theories of the mind. The second part is devoted to a description of the various forms of the human body, and to a discussion of the various theories of the body. The third part is devoted to a description of the various forms of the human soul, and to a discussion of the various theories of the soul.

The fourth part is devoted to a description of the various forms of the human spirit, and to a discussion of the various theories of the spirit. The fifth part is devoted to a description of the various forms of the human intellect, and to a discussion of the various theories of the intellect. The sixth part is devoted to a description of the various forms of the human will, and to a discussion of the various theories of the will.

The seventh part is devoted to a description of the various forms of the human emotion, and to a discussion of the various theories of the emotion. The eighth part is devoted to a description of the various forms of the human passion, and to a discussion of the various theories of the passion. The ninth part is devoted to a description of the various forms of the human desire, and to a discussion of the various theories of the desire.

The tenth part is devoted to a description of the various forms of the human action, and to a discussion of the various theories of the action. The eleventh part is devoted to a description of the various forms of the human thought, and to a discussion of the various theories of the thought. The twelfth part is devoted to a description of the various forms of the human feeling, and to a discussion of the various theories of the feeling.

The thirteenth part is devoted to a description of the various forms of the human reason, and to a discussion of the various theories of the reason. The fourteenth part is devoted to a description of the various forms of the human wisdom, and to a discussion of the various theories of the wisdom. The fifteenth part is devoted to a description of the various forms of the human knowledge, and to a discussion of the various theories of the knowledge.

SECTION SECOND.

THE PHYSIOLOGY AND PATHOLOGY OF THE EYE.

IN this short chapter, we purpose to take a very rapid view of the leading phenomena witnessed in the healthy and diseased eye, as illustrative of those general principles which we have endeavoured to establish in Physiology and Pathology.

We have clear evidence that the function of absorption is carried on in the human eye. We not only sometimes see scars and inflammatory effusions disappear from its textures, but in abstinence, either from famine or disease, we can perceive its very evident diminution, especially that of its fatty parts. Nutrition, too, constantly goes on in it; for, if we witness its diminution during abstinence, we also perceive its rapid enlargement and return to its former condition, when the cause of the abstinence is removed. Moreover, we know that in the eye a great variety of textures are constantly kept up. The function of secretion is distinctly performed by the eye. Of this, the evident flow of tears is a convincing example.

No organ of the same size of the human body contains so many various textures as the eye. The conjunctiva is a mucous membrane, the sclerotic is a fibrous membrane, the retina is of a nervous nature, the iris and the muscles of the eyeball are muscular, and the ball is embedded in cellular and adipose tissue. Moreover, its structure is permeated by bloodvessels, some of which are visible, and by nerves communicating with the brain, nerves supplying motion, nerves supplying common sensation, and one nerve, the optic, the medium between the outer world and the mind, of a peculiar sense.

The remarks we made relative to the connection between the brain and the functions of any part, are strikingly exemplified by what takes place in the eye. If the optic nerve be cut or pressed upon, so as to hinder the communication between the retina and the brain, vision is lost; if the motor nerve be destroyed, the power of turning the eyeball, in obedience to the will, is gone, and we have squinting; and if the sensor nerves be destroyed or injured, so that the communication of their ultimate filaments with the brain is destroyed, then we not only no longer feel the presence of anything touching the eye, but also we have a curious set of phenomena. The sensation of want of moisture is no longer transmitted to the brain; hence none is secreted, and the eye, exposed to the action of the atmosphere, inflames.

The eye affords many illustrations of what we had occasion to say regarding

both voluntary and involuntary motion, and of the involuntary action of the mind over the body. We have striking examples of these, both in the secretion of tears from mental emotion, and in the change in the appearance of the iris from various strong passions.

We see, too, upon examining the eyes of different races, that although the organ, in all mankind, serves similar purposes, yet that its appearance is often strikingly different in one race to what it is in another. In these we see instanced the law of varieties of the human race.

The eye, too, affords an illustration of that general law, the truth of which we have often had occasion to advert to—that every living structure must end in death. To the most acutely-visioned eye, the time must come when to it the brightest light will be darkness. Fortunate will it be, if, from its birth to its death—from the time when the ray of light first impinged upon its retina, to the moment when the last ray entering produced no change—none of the many diseases to which it, in common with every other organ of man, is liable, attack its structures.

This is seldom the case. From exposure to cold, many inflammations attack the eye. From hereditary predisposition, or a bad habit of body, tubercles, cancers, and other morbid growths, seize upon its structures. Various nervous disorders affect it, and in it we occasionally see hemorrhages, dropsies, and congestions, all of which proceed in accordance with the general principles which we have laid down.

We see curious illustrations of the variety of the inflammation, according to the texture attacked, in the various inflammations of the eye. In all we see the local changes of inflammation, congestion, secretion of lymph, serum, and of pus. But when the conjunctiva is affected, we have the usual symptoms of inflammation of mucous tissues, little pain, and little sympathetic fever. When the sclerotic is inflamed, we have considerable pain, and much fever; and when the retina is attacked with inflammation, much pain and high fever. The inflamed conjunctiva again secretes pus, and the inflamed iris, and other parts, lymph.

Sometimes, too, the lens becomes clouded, and we have an instance of the power of scientific surgery. The surgeon cuts out the lens which will not allow the passage of rays of light, and in its stead substitutes an artificial one of glass.

To conclude, we witness, in diseases of the eye, not only evidence of the power of remedies, but also the manner in which the remedial agent proves useful. We can see how bloodletting, counter-irritation, purgatives, opium, &c., prove beneficial. Sometimes, too, unfortunately, in these complaints, we have proof of how little can be done, and of regret at the limits set to our art; and too often, when treating diseases of the eye, as in treating diseases of other

organs, we are constrained to say, with the old Grecian philosopher and physician, *Ars longa, vita brevis*: "Art is long, and life is short."

CHAPTER III.

POPULAR SURGERY FOR EMIGRANTS, &c.

THE following observations on the treatment and management of accidents and diseases, which require the aid and services of the surgeon, are not intended to dispense with these, but rather to serve as a substitute for them when they cannot possibly be procured, and to enable any person of ordinary ingenuity to have recourse to such means and appliances as may prove most useful and serviceable in cases that require professional assistance. The instructions are intended to be altogether of a popular nature, and suitable to persons who have had no professional training.

We shall begin with wounds, as they are among the most frequent of surgical accidents, and as much ignorance is still generally prevalent among all classes as to their proper treatment, and many absurd, pernicious prejudices are entertained as to the highly sanative properties of certain tinctures, balsams, and salves, when applied to wounds, whether recent or of long standing, and however they may differ in their nature in consequence of the accidents which have caused them.

WOUNDS are divided into several kinds—as simple cuts, incisions, or what surgeons term incised wounds; bruised cuts, or contused and lacerated wounds, including scratches, stabs, pricks, or punctures; lastly, poisoned wounds.

Incised wounds made by a sharp, keen-edged, cutting instrument, are of easy treatment if they be not large, and if no important bloodvessels have been divided. The edges of the wound are to be brought closely together, and held in nice apposition to each other by strips of adhesive plaster, or court-plaster, applied at a little distance from each other, so as to allow of the ready escape of any oozing fluid, which often continues for some time, or of any matter should suppuration take place. A layer of surgeon's lint should be laid over these, and a roller is then to be placed round the part, taking care that it shall only cause a gentle degree of compression. Should the wound be on the finger, arm, leg, or toe, the strips of plaster ought not to be made to encircle the limb and overlap, for there is generally a tendency to swell in the parts round the wound, and they might thus come to act as a tight bandage, causing pain and mischief.

Should the part continue easy and free from pain, the dressing ought to remain undisturbed for several days—say three, four, or five, according to the size of the wound. In this case, when the dressing is opened out, the greater part, if not the whole of the wound will be found healed, the two sides having become reunited by what is termed the adhesive inflammation, without the intervention of suppuration. This union by the first intention, as surgeons term it, or adhesive inflammation, is formed by the coagulable lymph, secreted and effused, it is supposed, principally by the minute vessels of the injured part, called capillary, though some think the large bloodvessels also contribute to produce it. The orifices of the divided bloodvessels shoot into this layer of coagulable lymph from each side of the wound, and become reunited, so that the coherence is rendered firm and complete.

Should matters not proceed thus favourably, but the wound and adjoining parts become swollen, painful, and throbbing, the entire dressing, except the plaster strips, is to be removed, and a warm bread-and-water poultice applied, to hasten and promote the suppuration which is now inevitable. It may be advisable to remove all the slips of plaster, if the pain become violent and the tension great. Should these, however, be moderate, it will be better to retain one or two slips of plaster to keep the sides of the wound together, and to continue the poultice, changing it twice or thrice daily, until the inflammation and pain subside, and a healthy suppuration be established. This may then be changed for a dressing, consisting of a bit of lint spread with a little cerate, simple ointment, or Turner's cerate. If painful swelling and inflammation occur soon after the infliction of an incised wound, the best means of allaying these is to keep the part exposed to the air covered with a piece of linen or cotton cloth, constantly wet, to promote cold by evaporation.

Sometimes a part of the nose, the ear, of a finger, a toe, or of a muscle, is either nearly or entirely removed by a cut. In such a case, every effort should be made to restore and reunite the portion thus excised, by nicely and appositely readjusting it to its natural position, and securing it there by a proper bandage and suitable support. A few slips of adhesive plaster, with pads of lint, and some pieces of pasteboard softened in warm water, to adapt it to form a sort of mould around the part, may be employed for this purpose. It is now a well-known fact, that portions of the parts just mentioned have been completely excised, and again perfectly reunited in this way. The late Mr. Carpue, and the celebrated operative surgeon, Mr. Liston, succeeded admirably in thus repairing, by their artistic plastic skill, several sadly dilapidated noses. Their method of proceeding was first to pare off the edges of the ruined nose, to fit them for reuniting by the adhesive inflammation with a flap of skin of suitable size dissected from off the forehead immediately above it, which was twisted at the root of the nose, so as to allow it to be reinserted into its natural position,

and brought down over the nose, so as completely to cover all the defective portion of it. It was then nicely fixed in its new position by a bandage and suitable appliances. As soon as the reunion between the supplementary and other portion of the nose seemed to be secured, and the circulation through the former quite re-established, an incision was made through the twisted part to release it, and allow it to be laid neatly down, and reunited with the surface immediately below it. It has been usual in India, from an early period, to supply the nasal defect from the arm, which, with the excised partially attached flap, was brought across the nose, and retained in that position, until such union and vigour of circulation was established between the flap and parts of the nose as to insure its continued vitality, when its connection with the arm was cut off. This point has been thus dilated upon, solely to impress upon our readers the importance and propriety of always attempting to save a part excised under the circumstances mentioned.

BRUISED CUTS, OR CONTUSED AND LACERATED WOUNDS.—These differ from simple incised wounds, in being much more disposed to suppurate, to slough, and to show less tendency to heal by adhesive inflammation. They are also not apt to bleed much, even though large arteries be torn. Thus, an entire limb is sometimes torn and wrenched from the body, and yet but little bleeding may occur. When considerable bleeding occurs in a ragged wound inflicted by a saw, reaping-hook, or some cutting instrument with a similar sharp jagged edge, it will be proper to apply the cold-water dressing mentioned before, and continue it for twelve or twenty-four hours, to allay the bleeding, and moderate the inflammation which is likely to ensue. The warm bread-and-water poultice may then be applied to promote suppuration. In cases of severe contusion, with extensive laceration and but slight bleeding, it will be well to apply a few leeches in the vicinity, and to encourage the bleeding from their bites, as well as to foment the surface of the wound with warm water. After this, the warm bread-and-water poultice may be applied, and continued until suppuration be established, and a slough begins to form between the dead bruised parts and the living. This may then be exchanged for the linseed-meal poultice, which is to be continued not only until the slough be cast off, but till the cavity of the sore be filled up with new flesh, or granulations, as they are called. The poultices may then be abandoned, and two or three slips of adhesive plaster placed over the wound, or it may be dressed with a piece of lint spread either with simple ointment, or cerate, or with zinc ointment. Should the granulations sprout above the surface, they must either be repressed by being lightly touched with bluestone, (sulphate of copper,) or a piece of dry lint may be placed over them, which will have the same effect.

Gunshot wounds are merely severe contused wounds, which, however, are often of so complicated a nature as to require, for their proper successful treat-

ment, all the art and skill of the most expert surgeon. I shall, therefore, only observe in regard to them, that when a musket-ball, or a few small shot, have lodged superficially in a fleshy part of the body, it will be proper to try to extract them, if this can be effected by a slight incision, or without much irritating poking of the parts; otherwise, it will be as well to let them alone, trusting that they may either be discharged during the subsequent suppuration of the wound, or that it may fill up with granulations, and close over them, as is frequently the case. Among the most suitable applications at first, is the warm bread-and-water poultice, which is to be continued till the inflammation subsides, and the sloughs begin to separate. The linseed-meal poultice may then be substituted in its place, to promote healthy granulation.

A slight superficial tear or scratch, though often apparently of the most trifling kind, may, in an ill-conditioned state of body, or from being poisoned, as it is vulgarly called, by dirt, or some substance of an irritating nature, or much exposure to wet and cold, be followed by extensive dangerous inflammation in the surrounding parts. In this case, some leeches must be applied, rather wide apart to the parts around; and the bleeding is to be encouraged by warm fomentations, followed by the application of a large warm bread-and-water poultice.

STABS, PRICKS, OR PUNCTURES.—These are much of the same nature as contused and lacerated wounds; and when deep, or causing injury to large blood-vessels, nerves, or important viscera, are highly dangerous, from exciting violent and extensive inflammation. They are apt, also, to cause abscesses, which burrow deeply among the muscular parts, and there form extensive collections of matter. Very slight pricks or punctures will sometimes produce excessive nervous irritation, and even fatal locked-jaw. In cases of a clean stab, in a fleshy part, a good application, for the first twenty-four hours, will be the cold-water dressing, for the purpose of checking and moderating swelling and inflammation. At the end of this time, the warm bread-and-water poultice may be applied; and when suppuration is fairly established, the linseed-meal poultice should succeed it. When a thorn, prickle, splinter of wood, an insect's sting, or any other sharp irritating body, has got lodged in a part, the more speedily it is removed the better. If it cannot be done by a slight incision, and without much squeezing, poking, and such efforts as are likely to irritate the part much, and greatly to aggravate the inflammation that may succeed, it is better to leave it undisturbed; for, in all probability, it will be loosened, and ultimately removed, during the suppurative stage. Where acute pain, much swelling, tenderness, and throbbing of the part occur, and red lines are seen extending towards the trunk of the body, very active means must be employed to repress and subdue the inflammation. A number of leeches should be applied around the vicinity of the wound, which may have to be repeated more than once.

The bites, after being fomented with warm water, to encourage the bleeding, ought to be covered with a large warm bread-and-water poultice. Some laxative medicine should be also administered, such as four or five grains of calomel, followed, a few hours afterwards, by a dose of sulphate of magnesia or castor oil.

POISONED WOUNDS.—In this country, the most frequent wound of this kind is that caused by the common adder or viper, which, however, is seldom fatal; and when it does prove so, it is generally only in children, weakly, delicate persons, or those of broken constitution. Acute burning pain immediately follows the bite, succeeded by heat, swelling, redness, and tension, which rapidly extend, and frequently occupy the whole limb. These are accompanied with great dejection of spirits, alarming faintness, and excessive weakness and sinking of the vital powers. The pulse is quick, small, irregular, and contracted. There is also difficulty of breathing, with cold profuse sweats; confusion of sight and of the mental faculties; headache, sickness, and frequently a convulsive, bilious vomiting, very often followed by a general yellowness of the skin. The chief remedies to be relied on are, the application of a tight ligature above the part of the bite, if it be in the fingers or extremities, to prevent the absorption of the venom into the circulation—a procedure which Paré and Fontana found very useful, and which was also recommended by Sir Astley Cooper and Sir Everard Home—while strong stimulants are given internally, to rouse and invigorate the sinking powers of the system: such as a glass of strong sherry wine, or of spirits, as brandy, rum, &c., whichever is at hand, may be given every two or three hours, along with a small tea-spoonful of the aromatic spirit of ammonia, or of the succinated spirit of ammonia, which closely resembles the eau de Luce. The wound and parts adjacent should be every now and then well rubbed, either with olive oil, or, what is better, with a liniment, composed of three table spoonfuls of olive oil, one of oil of turpentine, and one of ammonia. Should preparations of ammonia not be at hand, a tea-spoonful of the eau de Cologne may be substituted for them. In India,* arsenic, according to Messrs. Russell and Ireland, has been found to possess considerable specific power in obviating and removing the ill effects resulting from the poison of various serpents. Mr. Ireland used to give two drachms of the arsenical solution, with ten drops of laudanum, in an ounce and a half of peppermint water, to which half an ounce of lemon-juice was added, just before it was taken. This draught was repeated every half-hour for four hours in succession. The inflamed parts were often fomented and rubbed with the liniment before mentioned, composed of turpentine, ammonia, and olive oil. Cathartic glysters were given as soon as the patient began to be purged, and the arsenic was discontinued. The plant called *mikania guaco* is regarded in South America as quite a specific for the

* We here think it our duty to state, that arsenic ought never to be given except under medical sanction.

bites of serpents. The plan is to chew it, and then lay it on the wound, the juice being also used as an internal medicine. A further investigation, however, of the real power of this plant is required. As excision of the bitten part is one of the most powerful means of preventing the absorption of the venom, it will be highly proper to have recourse to it, when it can be immediately properly done.

BITE OF A MAD DOG—HYDROPHOBIA.—The most dangerous of all poisoned wounds in this country arise from the bites of certain rabid animals, which cause one of the most fearful and incurable maladies to which the human frame is liable. Writers are agreed that this madness or rabies of certain animals may either arise in them spontaneously, or may be communicated to them by the bite of an animal already labouring under it. It is, however, doubtful if it ever arises spontaneously in man, for the cases adduced as proofs are by no means free from ambiguity. Horses, mules, asses, horned cattle, pigs, and yet more frequently foxes, wolves, cats, and dogs, are attacked by rabies. The infection, though it may be received and propagated by other animals, probably never originates in any except those of the canine species. It is supposed that the hydrophobic poison can only produce its effects on the human constitution by inoculation; in other words, that the virus, which is blended with the saliva of a rabid animal, must either be introduced into the true skin by a bite, or be applied by a scratch, excoriation, or cut. Man seems much less susceptible of the infection than dogs. A case is on record, of four men and twelve dogs having been bitten by the same rabid dog: all the dogs died mad; but all the men escaped, though they used no other means of prevention than such as are every day seen to fail. On an average, not more than one person, out of sixteen bitten, takes the disease;* an important fact to be kept in view while judging of the real merit of any preventive means of treatment.

An experiment, made by Majendie and Breschet, would seem to show that the saliva of a hydrophobic patient may, by inoculation,† communicate the distemper to dogs. This experiment, however, has been repeatedly tried in England without any effect. The time which usually elapses between the bite and beginning of the disease, varies much in different cases. The latter rarely appears sooner than a fortnight—most frequently in six or seven weeks—after the infliction of the bite. The intervals, in well-authenticated cases, have varied from those just mentioned even to fourteen, eighteen, and nineteen months. It may be doubted, or at least regarded as a very rare occurrence, if the interval be ever longer than this, though an instance has been related, where twelve years were said to have elapsed between the reception of the bite and the commencement of the disease.

The commencing symptoms of the disease are, a dull, heavy pain in the

* See Hamilton on Hydrophobia.

† Orfila, *Traité des Poisons*, t. 2, p. 529, ed. 2.

wound, and inflamed appearance of the scar upon it, which even festers, so as to discharge a thin, reddish, ichorous matter. The pain, should the bite have been in the hand, shoots up towards the shoulder and neck. Gloom and dejection of spirits succeed, with listlessness and anxiety. The patient becomes timid and distrustful; his sleep is no longer sound or refreshing; he is restless throughout the night, and in the day he courts solitude. In a few cases the disease is ushered in by a shivering fit. The appetite now begins to fail, and some thirst is felt, when the striking and peculiar symptom which gives the malady its name—the dread of liquids—is discovered, often as if accidentally, by the patient, who, on trying to drink, finds, to his dismay, that he can no longer swallow them.

In some rare cases, it cannot be correctly said that any melancholy stage, marked by low spirits and mental despondency, precede the feeling of pain about the wounded part, and the difficulty of swallowing fluids.

This difficulty of swallowing liquids is accompanied with terror at the mere sight of them, nor can the patient hear them mentioned without disgust. Yet this is not owing to any actual mental aversion to fluids, but to the intolerable sensations which the attempt to swallow them, or the mere sound or sight of them, produces. Should the patient attempt to drink, he instantly sobs convulsively, feels a dreadful choking pain, and is seized with general convulsions. Though patients should summon up the utmost resolution, and try to drink, still, on the fluid approaching their lips, the intolerable feelings excited baffle and render vain all their efforts. Should a little drink be got over with much suffering, it is sometimes immediately ejected again, mixed with a little bile. This hydrophobic symptom is no delirious terror or mental hallucination—it is a sad reality, a terrible experience, which at first astonishes the patient himself. Sometimes even lucent surfaces, which reflect light so as to resemble water, are intolerable to hydrophobic patients. In addition to this very singular dread of fluids, there are other distressing symptoms in this fearful disease, for the mind and body are extremely irritable, and excessively susceptible to all impressions. Thus there is constant watchfulness and inquietude, great impatience, and sudden bursts of anger from trivial causes; much distress and violent paroxysms are induced by the slightest motion of the air, the buzzing of a fly, shutting of a door, &c. The patient exhibits great timidity, is a prey to continual apprehensions, and has occasional fits of incoherence and delirium, from which he soon recovers. He is annoyed and oppressed, too, with a copious secretion of thick tenacious mucus in the mouth and upper parts of the throat, which, being unable to swallow even his own saliva, he is continually spitting out. The mental derangement differs greatly in degree in different cases: in some it is little more than great irritability and impatience; in others it proceeds to muttering and incoherent talking, though questions are rationally answered;

and in a few it rises into brief fits of ungovernable rage and fury, the patients biting and tearing themselves and everything near them.

The muscles employed in swallowing become at length affected with constant excruciating pain, which gradually extends to the diaphragm and muscles of the abdomen. The fits of suffering are more severe, the convulsions increase in violence, the patient's countenance is expressive of the greatest horror, while his eyes look furious and are bloodshot. Despite, however, of these symptoms, the patient sometimes retains his senses to the last. The duration of the symptoms, from their commencement to their fatal termination, varies from about forty hours, to five or six days.

The symptoms and course of hydrophobia have been thus minutely described, in order that it may be distinguished from tetanus or locked-jaw, for the difference between them is not always so clearly marked as to prevent such a mistake. Slight wounds of the toes, fingers, or other tendinous parts, are generally the cause of tetanus, which also does not commonly occur until some time after the infliction of the local injury, and when the wound is probably healed. It is indicated by violent fits of general spasm, beginning about the throat and neck, and accompanied with difficulty or inability of deglutition. The slightest causes excite these spasms, such as the effort to swallow, to alter the position of the body, or even to speak. The spasms generally occur sooner after the reception of the local hurt in tetanus than in hydrophobia; the jaw, too, is rigidly locked; the muscles of the neck and back are especially affected; the muscular contractions are more persistent, only slightly abating at intervals; while the fever, quickness of pulse and thirst are less, and the excessive mental irritability and anxiety which are so marked and distinctive in hydrophobia, do not prevail in it.

Remedies.—The most powerful medicines are universally admitted, by all unprejudiced members of the medical profession, to be utterly ineffectual either in controlling or alleviating this fearful malady. It is, therefore, of the utmost importance to have recourse to preventive means, to insure, if possible, the safety of the person who has had the misfortune to be bitten by a rabid dog. Now, certainly, the most rational method of prevention, as being the most effectual and the most to be relied upon, is complete and perfect excision of the bitten part as early as possible after the injury has been received. That this may be thoroughly and effectively done, it has been recommended to introduce a probe, or blunted wooden skewer, into the bottom of the wound, and then to make a clean and perfect excision of the part surrounding the wound to the extent of a quarter of an inch beyond it in every direction, so that the part thus excised, or scooped out, may resemble the top of the finger of a glove. Should any of the fingers have been the part wounded, it has been advised, instead of simple excision of the bitten portion, to have the finger amputated as soon as possible

after the accident, above that part. To insure still farther the perfect elimination or destruction of the poison after excision, the part may be rubbed over with some powerful escharotic, such as the caustic potash, nitric acid, or muriate of antimony. It is certainly wrong to rely, as it has sometimes been done, on the application of escharotics alone, to insure the destruction and removal of the hydrophobic poison from the bitten part. This was done in the case of a young lady who had been bitten in the lip by her rabid lap-dog, by the celebrated John Hunter, who was consulted on the occasion, and contented himself with merely applying caustic to the wound, to the exclusion of excision. The application of the caustic proved ineffectual, and the consequence was a fatal result. If, when the accident occurs, neither a medical man nor any other person can be procured to excise the part, and the wound should have healed, still, should an opportunity present itself of having this done properly after the lapse of some days, or even several weeks, it will be advisable to have it then performed, as it is supposed the effects of the virus may be as yet dormant, and altogether limited to the parts implicated in the bite. Some medical men are inclined to believe that excision of the bitten part may prove effectual as a preventive, if performed at any time previous to the actual commencement of the symptoms of disease. It is unnecessary to enumerate any of the various specifics which have been extolled as preventives of hydrophobia, for, in general, little or only very insufficient proof has been adduced of their real efficacy.

CONTUSIONS OR BRUISES.—These are always accompanied with more or less effusion of blood in the parts immediately under the skin, where the injury has been inflicted. This proceeds from the rupture of many of the minute bloodvessels, and is always in proportion to the severity of the injury and according to the nature of the part. If this be muscular, highly vascular, and contain much loose cellular membrane in its structure, then the blood is more extensively and rapidly effused than where it consists of dense membranous matter, only scantily supplied with bloodvessels and covering the bones. Thus, a comparatively slight blow near the eye will cause abundant bloody effusion around it in the loose, highly vascular structure involving its orb, while a violent stroke about the knee, or on the shin, will be followed with little of it. The blood thus effused imparts to the skin over the bruised part a bluish-black appearance, shading off gradually into a purple, reddish hue. As the injured part recovers, and is restored to its natural state, this discoloration changes into a bluish-greenish-yellow, then to yellow, and finally disappears.

Treatment.—Warm fomentations, flannels wrung out of warm water, or a warm bread-and-water poultice, are the best and most suitable early applications to bruises. They relax the parts, remove the tension, and thus assuage the pain. Should the contusion be severe and near a joint, then leeches must be applied in numbers proportioned to the severity of the injury, and repeated,

if necessary, more than once. On the removal of them, the bleeding from their bites may be farther promoted by warm fomentations, or a large warm bread-and-water poultice may be applied. To remove and promote the absorption of the extravasated blood, after the pain and inflammation have subsided, a solution of half an ounce of muriate of ammonia to a pint of vinegar, and the same quantity of spirit, will form an excellent lotion. A piece of linen applied over the part is to be kept constantly moistened with this lotion. Friction also twice or thrice a day with simple spirits, or opodeldoc, will be useful in promoting the same end. When the collection of extravasated blood is large, as is sometimes the case, about the shoulder and under the scalp, from a severe bruise, it is not advisable to puncture the part to let out the fluid, for the access of the air to such portion of it as cannot be pressed out, is apt to make it putrefy, when febrile symptoms arise, accompanied with an erysipelatous redness, extensive abscesses and sloughing, which often prove fatal.

Should sloughing, however, be threatened from distension, produced by the extravasated fluid, it will be proper to discharge this by a free incision. If weakness of a joint remain after the removal of the inflammatory symptoms, the best way of removing this, and reinvigorating the part, is to subject it for several minutes at a time, twice or thrice daily, to a douche, or fall of cold water; and the colder this is, the better.

Cases are frequent where the whole scalp is enormously distended by the blood effused in consequence of a blow, and yet the swelling will generally disappear in about a week with the aid of bleeding, purging, and the lotion, composed of muriate of ammonia, vinegar, and spirits, as mentioned before.

SPRAINS.—These often constitute very severe accidents, and frequently cause much annoyance and suffering for a long period after their occurrence, though they may have been treated in the most judicious manner. They are caused by the wrenching, straining, tearing, or twisting of the ligaments and sinewy parts, which connect and bind together the bones which form joints. The joints most liable to these casualties are the wrist and ankle. The pain of a sprain at the moment of occurrence is at times excruciating, and frequently continues so on the slightest effort to move the part. A sprain also often lays the foundation of the disease termed white swelling. Some surgeons even consider a broken limb as a less evil than a sprained joint, as the former may very generally be cured in a few weeks, if there be no accompanying wound with it, while the latter may, despite of the employment of the best curative means, constitute for weeks, or months, a weakness or stiffness of the joint.

Treatment.—Perfect rest is essential in a sprained joint, and should it be the knee or ankle that is injured, the patient should either lie in bed, or on a sofa. Warm fomentations, or warm moist flannels, may be repeatedly applied for some hours, and at bedtime a warm bread-and-water poultice. This treatment

may be pursued for a few days, the joint being meanwhile kept perfectly quiet. Should severe pain be present, and continue for the first few days, leeches ought to be applied, and repeated again, or oftener, if they seem needed.

If the stiffness about the joint remain some time, which is not unusual after sprains, straps of soap plaster may be applied round the joint, and the warm bread-and-water poultice continued at night.

A simple, popular, and highly efficacious means of curing sprains, and obviating the after weakness and ill effects apt to result from them, is the cold water douche. This ought to be applied immediately after the accident, by pouring on the injured part, from a height, the coldest water that can be procured, until it becomes benumbed, when the pain and difficulty of moving will be somewhat abated. These, however, recur again, as the numbness goes off, though to a certain degree slightly alleviated. The douche must now again be had recourse to till the numbness recur, when it may be intermitted. Its alternate use and intermission may be thus continued for two or three days, which generally suffice for the cure. Should circumstances allow of employing the aid of a natural or artificial fall of water, it will do better than the form of douche just mentioned. Whether this or the former means of cure be employed, great care must be taken that the part sprained be subjected, on recovery, only very gradually to exercise, and to that of the gentlest kind. It will be proper to have the joint surrounded with a somewhat firm bandage, or straps of the soap or adhesive plaster, to give it support when first exercising it.

BURNS AND SCALDS.—These require no definition, though it will be convenient to consider them as being of several kinds, according to their relative degrees of severity. In the first there is but a faint redness of the skin, no swelling or fever, the inflammation only slight, and soon subsiding. In the second degree, the redness is accompanied with swelling and sharp pain; and should the burn be extensive, the constitution delicate and irritable, the injury excites more or less symptomatic fever. Though the inflammation be acute, it generally ends in resolution, and not suppuration. In the third degree, vesicles are either rapidly or gradually produced, which contain a limpid or yellowish fluid, showing that the burnt or scalded part has suffered more than in the former cases. The symptomatic fever is here greater, the pain more severe, accompanied sometimes with shiverings and convulsions; and unless the vesications be few and small, suppuration is inevitable. In the fourth degree, the part burnt is either deprived of its vitality, or so injured, that, after violent supervening inflammation, the flesh rapidly mortifies. In cases of this degree, where the burns are large or deep, the constitutional symptoms are commonly very severe; the pulse small, quick, at times irregular, and there is a great tendency to shiverings and convulsions. If, however, the burnt surface be at once de-

stroyed, the pain is generally less than in other instances, in which the degree of injury is somewhat less severe.

The two slighter kinds of these four degrees of burns generally end without suppuration, in what is termed resolution; the third kind is succeeded by suppuration; and the fourth, by mortification. In regard to this division of burns into those differing from each other as to severity, it is proper to observe, that it is altogether arbitrary, and is merely useful in aiding us to form a more correct idea than we might otherwise do, as to the most appropriate treatment. For we frequently see all these different degrees of injury exhibited in one and the same burn, from the slightest up to the most severe; thus, in one part of it, there will be only slight inflammation; in another, suppuration; and, elsewhere, ulceration, gangrene, and mortification. Hence has probably arisen the so great diversity of opinion relative to the best mode of treatment. Perhaps, too, due attention has not always been given to the fact, that the state of a burn is constantly changing; so that remedies suitable to one stage may in another become useless, and even pernicious. Constitutional peculiarities also cause great diversities in the appearances of burns, and in the effects of remedies upon them. Thus, though several burns, resembling each other at first, be treated exactly alike, not two will heal precisely in the same manner.

Burns are dangerous in proportion to their extent and severity. The most severe, if confined to narrow limits, may be of little consequence, while others of the slighter and milder kinds may become dangerous, and actually prove fatal from their great extent. The danger of slight but extensive burns and scalds, is attributed to their destroying, or greatly impeding, the due function of the skin throughout the part which they occupy, and thus interfering with, and clogging the general functions of the body. The danger from scalds depends much upon their size, but that from burns not merely on their extent, but also on their depth. The probability of recovery differs much according to the age and constitution of the patient; for burns in delicate unhealthy individuals, and in young children, are more dangerous than in strong healthy adults. The situation of the injury is to be considered of importance; as burns about the head, throat, breast, and abdomen, generally produce worse consequences than those upon the extremities. Death, in consequence of burns, may occur from the violence of the inflammation, from the extent and depth of the injury, the shock given by it to the whole system, from the violence of the symptomatic fever, from convulsions, the profuse suppurative discharge, or from the effects of gangrene. Great difficulty of breathing is frequently produced by extensive superficial burns, which illustrates what was previously stated as to their impeding the due action of the skin, and thus interfering with other parts of the body in the proper discharge of their functions.

Divers deformities and mutilations result from suppurating burns, which

often cause disfiguring, irregular scars, stiffness and contractions of the joints, wryness and distortions of parts, incurable blindness, specks on the cornea, concretions of the fingers, toes, or eyelids, closure of the lachrymal passages, or of the other ducts and apertures, and eversion of the eyelids.

Treatment.—Perhaps no cases of disease that claim the surgeon's attention, have caused greater diversity of opinion as to their most appropriate treatment, or excited a greater disposition to credulity and prejudice, than those of burns and scalds. It has been absurdly imagined, that it might be possible to discover some application equally appropriate for every kind of burn; nay more, for every stage and state of it. And yet, one would think that it ought to be self-evident to every intelligent reflecting person, that as all burns differ from each other, there can be no single uniform plan of treatment equally adapted for all. As the effects of burns are similar to those of inflammation in general, including suppuration and mortification, then the same common principles which we take for guidance in the treatment of inflammation and its consequences, ought also to be observed in the treatment of burns.

In severe burns and scalds, the sufferer ought to be put to bed as soon as possible, and the clothing immediately removed from the injured parts with the utmost care and caution, lest the blistered or burned skin should be torn off with it, and the accident thus aggravated, so as to render it more dangerous and difficult to heal. In some burns, the ash of the destroyed body-linen, or those portions of it that are reduced to tinder, will be so adherent to the injured part that it must be left, as all attempts to remove it will only cause increased irritation. Where vesications or blisters of the surface follow burns and scalds, too much care cannot be taken to preserve them entire, for the first two days or so after the accident; for if early broken or purposely opened, the raw sensitive surface of the true skin below being thus exposed to the action of the air, becomes irritated and converted into a painful sore, slow in healing, and distressing to the patient. When in bed, all the uninjured parts of the patient's body ought to be covered with warm bedclothes; and should drowsiness, shivering, coldness of the extremities, with weakened pulse, supervene from the constitutional shock, bottles of hot water must be applied to the patient's feet, and some hot wine and water given to him, or some warm toddy made with brandy, whisky, or any other wholesome spirit. If the patient be more accustomed to malt liquor, a little of it may be given well warmed, sweetened with sugar, and spiced with a little ginger. If any preparations of ammonia are at hand, twenty drops of the ammoniated aromatic tincture, or thirty drops of the water of the acetate of ammonia in a little sweetened water, may be given every three or four hours. When, from the pain and suffering, there is great restlessness and sleeplessness, it will be proper, in the case of an adult, to give twenty or thirty drops of laudanum to soothe distressing feelings and procure

sleep. Nothing, however, of this kind should be given to children, except through a medical person, as fatal results from the maladministration of opiates by unprofessional people are, unfortunately, of too common occurrence. In patients of strong robust habit of body, burns and scalds often induce strong symptomatic fever, and, when situated on the chest or abdomen, there is reason to dread the extension of the external inflammation to the contiguous lining membranes of both those cavities. In such cases it may be necessary to bleed from the arm, to give ten or fifteen drops of antimonial wine every two or three hours in tepid lemonade, apple-tea, barley-water, or thin oatmeal gruel, with gentle aperient medicines, to reduce the febrile action, and moderate the subsequent local inflammation.

Local Applications.—Should the burn, or scald, not be so severe as to destroy the vitality of a part, but merely to excite inflammation in it, cold applications will be very soothing and beneficial, and, if applied immediately after the occurrence of the accident, they will often prevent any subsequent inflammation and vesication. They may consist of cloths dipped in ice-cold water, or the coldest that can be procured, or pounded ice enclosed between cloths, or cloths soaked in equal parts of water and spirits, or in a solution of two drachms of acetate of lead dissolved in a quart of cold water, with the addition of a wine-glassful of spirits, and a like quantity of vinegar. Should the burn, or scald, neither have caused any destruction of parts, nor such a degree of injury as will necessarily be followed with sloughing and abundant suppuration, cotton wadding will be one of the best local applications. It should be applied with the glazed side outwards, in three or four folds, as smoothly as may be, and confined under a gentle degree of pressure by a roller. The glaze on one side of the cotton wadding makes it all the more suitable as an application, inasmuch as it renders it less pervious to the air. Considering the cheapness of cotton wadding, its great utility in burns, and the frequent occurrence of these as accidents, it would be well, in a somewhat numerous family or household, always to have a good supply of it at hand, ready for cases of emergency. Cotton itself, when the wadding cannot be had, will be an excellent substitute for it, provided it be carded, or teased, and carefully freed from all lumps and knots previously to its application. It is to be laid thickly and smoothly over the injured part, and secured by a bandage, which should cause a slight degree of compression on the part. Another very useful dry application, though secondary to the cotton wadding and cotton, and only to be used when they cannot be procured, is flour, which should be thickly dredged over the injured parts. These may then be covered with a wrapper of cambric, or a thin linen handkerchief, which should also be well dusted over with flour before being applied.

It is now a well-known fact, that warm local stimulants much alleviate the painful feelings, and lessen the inflammation caused by burns. This is sup-

posed, in severe burns, to be owing to a part being deprived of its vitality, while those around it are weakened—a condition similar to that in mortification, where stimulants prove useful, by exciting and invigorating the enfeebled and impaired functions. Among the liquid applications, the most efficacious and the most generally suitable to all burns and scalds, however severe they may be, are the warm stimulants used and recommended by the late Dr. Kentish, of Newcastle. These are, spirits of turpentine, rectified spirits of wine, or proof-spirits, which are to be heated by immersing the cup or vase containing them in water, as warm as the hand can bear, and then to be gently applied over the burnt or scalded part by a feather, or a large pencil of camel's hair. This application is to be continued for ten or fifteen minutes, when a piece of lint or soft linen, thickly overspread with a liniment of the consistence of cream, formed by mixing equal parts of the resinous or basilicon ointment with spirits of turpentine, is to be laid over them, and secured by a roller. This last dressing must remain on for twenty-four hours at least; and, on its removal, the parts are to be washed with proof-spirits, and the same liniment as before immediately reapplied. After other twenty-four hours, the dressing should consist of a liniment composed of basilicon ointment and camphorated oil; but if this be found too irritating, a piece of lint or linen may be thickly spread with calamine cerate, or zinc ointment substituted in its place, and continued. Such is the treatment introduced by Dr. Kentish, and still much adopted throughout the coal districts around Newcastle.

The other liquid applications are the Carron oil, a liniment composed of equal parts of lime-water and linseed oil, which is now but seldom used; a mixture of milk and lime-water, in equal parts, or milk alone, may be also employed. When these are used, a piece of lint or soft linen is well smeared over with them, or dipt into them, and then applied to the injured part. In burns, where the injury is deep, and the parts much charred, a bread-and-milk poultice will be found an excellent application from the beginning, by its soothing, emollient effects. It is to be spread thinly on a linen cloth, and so applied. About forty or forty-eight hours after the occurrence of the accident, the serum contained in the blisters or vesications of burnt or scalded parts becomes turbid, a reddish streak of inflammation appears round their base, and they become painful. As by this time a film or thin layer of coagulable lymph, eventually to constitute the new scarf skin, has begun to be deposited over the highly sensitive true skin, the vesications are to be freely opened to let out their contents, and the scarf skin, of which they consist, may be cautiously removed, as it is apt to prove a source of irritation, and a piece of lint, pretty thickly spread with simple ointment, should be applied over them. Should the discharge from them become abundant, this dressing may be changed for one of calamine cerate, or zinc ointment, to moderate it; or should they get into a painful, irritable

state, a dressing, spread with the ointment of the carbonate of lead, will prove soothing and alleviating. As very unseemly and inconvenient contractions and adhesions often follow as a sequence to severe burns or scalds, and this more especially should these have occurred near or over any of the joints, the utmost care ought to be taken to counteract and prevent their formation, if possible, by keeping the parts, while healing, in such a position as may most conduce to this effect. Should the burn have destroyed a considerable portion of the true skin, an ugly scar must inevitably result from it; and should the injury be near or over a joint, an awkward and incommoding contraction will often follow as a consequence of it, despite of every care and attention on the part of a skilful surgeon to avert it.

During recovery from burns, especially when severe, and attended with considerable sloughing of injured parts, and copious suppuration, the patient's strength must be supported by a nourishing diet, and a judicious exhibition of vinous stimulants. Should he have been accustomed to indulge freely, while in health, in the use of wine, or spirits, or malt liquors, he will now require a much larger quantity of these, to enable the powers of his system to support the weakening and depressing actions to which it is now subjected.

It is not uncommon for patients suffering from severe burns or scalds to go on favourably for some days, or even a week or two, and then to be attacked by inflammation, either in the head, chest, or abdomen, which is apt to prove fatal, in spite of all remedial measures. Sometimes sudden effusion in the brain takes place; for the patient, after going on well for a little time, becomes dull, heavy, lethargic, and dies in a few hours. Effusions into the chest, abdomen, and particularly the head, are still more apt to occur in children than in adults, producing a fatal result. Such effusions are more especially apt to follow severe scalds or burns on the head or abdomen.

It would be improper to conclude these observations on burns without alluding to those caused by lime, which are often among the worst and most severe that occur. When lime, from accident or other causes, gets into interstices of the clothing, or between it and the skin, and is there exposed to wet, it slakes, and thus often produces severe burns, always accompanied with more or less destruction of the skin and adjoining soft parts, according to the longer or shorter time it has been in contact with them. As it is vain to attempt, in this case, to pick off the lime which sticks to the skin, vinegar should be immediately applied, to render it harmless, and deprive it of its burning power. A bread-and-milk poultice, or one of linseed meal, may then be applied, to promote the separation of the sloughing of the skin, which will necessarily follow, and the sore after this may be dressed with simple ointment, and a roller applied over the dressing, to retain it. When people are employed in slaking lime, particles of it may sometimes spurt into the eye, and, adhering to the transpa-

rent part of the eyeball, called the cornea, may produce irreparable mischief in a very short time, if proper means are not immediately adopted to prevent it. It causes intense pain; and the little spot where the particle of lime stuck quickly acquires a milky hue, which, rapidly extending, renders all that part of the same colour, and so opaque that partial blindness ensues. There is a profuse discharge of tears, the eyelids quickly become swollen and closed, and, should appropriate means not be immediately employed, blindness will be the consequence, either from opacity of the cornea, or from that portion of it to which the lime adhered being so burnt, that when the slough or dead part separates, the internal fluid parts of the eye escape through it, and the eyeball shrinks into a small, shrivelled, shapeless mass.

To avert this dreadful result, the eye ought to be bathed as soon as possible with weak vinegar and water, introduced between the eyelids and ball of the eye, and spread over the latter by means of a feather, or by a camel-hair pencil, if at hand. The feather, or pencil, should be used, to remove any particle of lime from the cornea, or from any part of the eye or eyelids, which ought to be well and gently laved with the weak vinegar and water, to destroy any further caustic effects of the lime. In a case such as this, medical aid ought, if possible, to be procured, for severe inflammation is almost sure to ensue, even under the most favourable circumstances. If, however, it cannot be obtained, some leeches should be applied, and the parts well fomented with warm water. The bowels ought also to be freely opened, by giving a tea-spoonful of the sulphate of magnesia every two hours, until it begin to act.

CHILBLAINS.—The parts affected with these become slightly swollen, red, hot, itchy, and painful, and, in a more advanced stage, vesicles arise, followed by ulceration. The parts most liable to chilblains are those where the circulation is weak, such as the fingers, toes, ears, and heels. They are most apt to occur in old, weak persons, and in delicate young people and children, whose circulation is languid, and who have been tenderly brought up, and not sufficiently exposed to the air, nor inured to that degree of exercise out of doors that promotes and imparts health and vigour to the frame. In cases where the skin is still sound and unbroken, one of the best remedies is to immerse the part for a few minutes, twice or thrice a day, in ice-cold water, to dry it well, and then apply a warm cover. Three or four days of this treatment generally suffice to remove the complaint. Individuals liable to this affection ought to keep themselves warmly clothed, and avoid as much as possible exposing, to frequent and sudden changes of temperature, the parts usually attacked by chilblains; for rapid and frequent change of temperature of a part, in which the circulation is languid, so impairs its vital energy, that when exposed to cold of some continuance, and subsequently to sudden heat, the reaction is apt to be greater than natural, and to become converted into inflammatory excitement. Various stimulating appli-

cations are recommended for chilblains, such as six parts of the tincture of soap, with opium, mixed with one part of the tincture of cantharides, camphorated spirits of wine, diluted muriatic acid, spirits of turpentine, mixed with an equal part of balsam of copaiba; a portion of these is to be rubbed, night and morning, over the affected part, which should be well defended from cold by warm clothing. When the skin has got broken, and an ulcer has formed, which is usually of slight depth, with thick white edges, and a viscid, slimy discharge, it may be dressed, night and morning, with the ointment of the red oxide of mercury, which is generally sufficient to effect its speedy healing; or it may be rubbed over with lunar caustic, and a linseed-meal poultice afterwards applied, which is to be changed, as soon as the slough is thrown off, for a simple dressing with the zinc ointment.

FROST-BITE.—Exposure for a considerable time to intense cold, and more especially if the individual remain in a state of rest, is apt to produce frost-bite in some of the extreme parts of the body, where the circulation is naturally somewhat weak and languid. Thus, the fingers and hands, the toes and feet, nose, ears, and lips, are particularly liable, when exposed to long-continued intense cold, to be frost-bitten, and sometimes to mortify in consequence. Sometimes severe cold will rather affect the system generally, instead of particular parts, especially if the person be engaged in active, fatiguing exercise at the time, such as in walking through deep snow. In this case the cold causes such a degree of somnolency, that the person can no longer resist the desire to indulge in a short sleep; but should he sit down for that purpose, it is almost certain that he will rise no more; for, on the instant, he sinks into a deep sleep, or rather stupor, which speedily terminates in death. Should he be happily found before life is extinct, he is cold and stiff, his breathing is almost suspended, and he is completely insensible, owing to the lungs and the brain being loaded with blood, that is repelled from the external to the internal parts by the excessive cold. In attempting to restore a person found in this state, and to revive the suspended functions without endangering his ulterior safety, great care is required as to the mode by which the temperature and circulation of the body are again brought to their natural normal condition. The patient should be conveyed into a cold room, and, being undressed, should be subjected to general friction over the body with cloths dipt in ice-cold water, and partially wrung, or with snow, which is still better, until the stiffness of the limbs begins to give way, and slight signs of reanimation become apparent. He may then be carefully dried, and placed in a cold bed, either in the same room, or in one equally cold; strong scents and sternutatories should be applied to the nostrils, to excite sneezing, and the lungs cautiously inflated, if natural respiration be tardy in returning, and a clyster administered, consisting of warm water and camphorated vinegar. On the signs of recovery having made some little progress, he may

be gradually subjected to a warmer air, and mild sudorifics may be given, such as twenty drops of the aromatic tincture of ammonia, or of the solution of the acetate of ammonia, along with a little weak tea, or weak wine negus, to determine the circulation towards the skin, and promote a gentle perspiration. In endeavouring to restore frost-bitten parts to their healthy state and natural temperature, local means, similar to those just detailed, are to be employed, and similar precautions are to be taken in regard to the application of external warmth—friction of the part with snow, or, if it cannot be procured, with cloths wrung out of ice-cold water, until returning feeling be perceived. The part may then be dried, and the friction prolonged with the hand, until the natural feeling and temperature be perfectly restored. Should inflammation succeed, in consequence of imprudent, injudicious means of restoration having been employed, a warm linseed-meal poultice may be applied, or a few folds of linen, wet with a warm solution of acetate of lead, in the proportion of two drachms of the acetate to a quart of water, with the addition of half an ounce of laudanum, to soothe and alleviate pain. If the patient be robust and of a full habit of body, and general febrile symptoms supervene, a moderate bleeding will be proper. Where mortification occurs, the best dressing will be the basilicon ointment, mixed with an equal part of spirits of turpentine. A piece of lint, spread with this mixture, is to be applied over the part, and above this is to be placed either a warm bread-and-water poultice, or one of linseed meal.

WHITLOW.—This is an acute inflammation that occurs at the ends of the fingers, and forms a painful swelling, which sooner or later suppurates. The cause of it is not always obvious. Sometimes it is produced from the finger having been bruised, or from the prick of a pin, needle, or splinter of wood, or from what is termed an anger-nail, or from a little chop, crack, or wound becoming irritated, either by being suddenly warmed after long exposure to a sharp degree of cold, or from contact with some acrid matter. Thus, it is not unfrequent among washerwomen, from any slight chops or fissures which they may have about the ends of their fingers, getting irritated by the soap and soda which they use. Its most ordinary and slightest form is when it occurs at the side of the finger nail, causing inflammation, with sharp, throbbing pain, speedily followed by suppuration, indicated by a small whitish swelling along the side of the nail. This, if not opened soon, bursts of itself, and the disease now terminates. Sometimes patients will neither allow this little imposthume to be opened, nor open it themselves, when it is seen gradually to shrink, and finally disappears by internal absorption. When the inflammation penetrates a little deeper, and causes ulceration of the true skin, on the matter bursting externally, sometimes a small fungous excrescence arises from it, and appears through the opening in the scarf skin. This is painful and tender, and, to facilitate its removal, the scarf skin should be clipped away from about it. A poultice of bread

and water may be then applied for a few days, and a dressing with calamine cerate, or zinc ointment, may succeed it.

Another and much more severe form of whitlow is, when it forms in the bulbous points of the fingers in front, as in this case the matter forms at a greater depth, and the scarf skin being thicker and tougher does not readily yield, to allow it to escape. The pain, under these circumstances, sometimes extends up the hand, and even to the arm, and the matter at times burrows along the finger. The proper treatment in this case is to make an early, free, and deep incision lengthwise through the skin, and to apply a poultice, a procedure which procures almost immediate relief from great suffering.

There is a third kind of whitlow, which often arises without any apparent cause, and which must be regarded as its most severe form. In this case the inflammation begins in the sheath containing the tendons, or parts contiguous to them; the finger swells, the pain is intense, and unless prompt remedial means be employed, the inflammation extends into the hand, and the tendons, with one or more of the bones, are frequently destroyed. Leeches should be employed frequently in this case, with warm fomentations, and a bread-and-water poultice. But the best remedy, and which will most certainly alleviate the intense pain, and most probably control at once the violence of the disease, is an early and free incision down to the bone. This procedure, in order to be duly effective, ought to take place within thirty hours after the commencement of the disease. After the parts have been thus freely divided, a poultice may be applied, and continued for a few days; to be then changed for a dressing of the resinous or basilicon ointment, which may be accompanied with a little pressure by the application of the bandage. It is almost unnecessary to observe, that a surgeon ought, if possible, to be got in cases of this kind; otherwise it can scarcely be expected that the proper treatment will be adopted. Indeed it frequently happens, that though medical aid is to be had close at hand, it is not sought for in these cases until the mischief has unfortunately made so great progress, that the surgeon, on arriving, finds that, though he shall subdue the inflammation, a portion of the finger must be lost, and amputation ultimately performed.

BUNIONS.—These most commonly occur on the ball of the great toe, or on the instep of the foot, and are caused by undue pressure on those parts by over-tight boots and shoes. A bunion begins with pain, tenderness, redness, and slight swelling of the part pressed upon, which gradually subside and disappear in a few days, if the boots and shoes in fault are laid aside, and others more roomy and easy worn instead of them. Should this precaution not be adopted, all the symptoms just mentioned become aggravated; the parts adjacent become thickened and indurated, the bones of the joint enlarge, and at length undergo a sort of partial displacement, or what is termed a subluxation. The swollen parts

project more and more against the shoe, and are thus kept in a state of continual irritation, so that effusion, thickening of the membrane and suppuration, with obstinate sinuses, may follow, and finally cause distressing lameness. This, however, is the more severe and more rare form of the disease, for the suffering is generally such, in the earlier stage of the disease, that patients are glad either to have two or three slits made in the shoe, where it presses most on the part, or to substitute wider ones. The pressure being thus removed, the pain, tenderness, and redness diminish; but the tumour abates but little, feels as if distended with fluid, and subsequently becomes hard and solid. If the tumour be on the instep, the shape of the foot is not much altered; but if at the ball of the toe, much deformity results from it, and it is irremovable. The treatment, where the inflammation is slight, may consist in fomenting the part well with warm water, and applying a poultice at night. When the symptoms are more severe, a few leeches must be applied, fomentation afterwards, and then a poultice. Cooling, discutient lotions, consisting either of two drachms of muriate of ammonia to about eight ounces of water, two of proof-spirits and a like quantity of vinegar, or two drachms of acetate of lead to a quart of water, a wine-glassful of proof-spirits and an equal quantity of vinegar, may be afterwards employed. It is scarcely necessary to add, that any undue pressure on the injured part by the shoe or boot must be afterwards carefully avoided.

INGROWING NAIL.—The growing-in of the nail generally affects the great toe, and, like the bunion, is also caused by the folly of wearing shoes that are too tight and narrow for the feet. The person, on first feeling pain and uneasiness, from the growing-in of the side and corner of the nail, thinks he may remove it by paring away and removing the corner, thus digging in, as it were—a process which gives only a little temporary relief, for the nail quickly grows again, and its tendency to penetrate inwards is still farther facilitated by being thus rounded off at the point. The sharp edge of the nail thus continuing to press on the tender subjacent parts, painful inflammation and ulceration ensue. We have known one instance, indeed, where these were so severe from this cause, as to render it advisable to amputate the first joint of the great toe. As all efforts to subdue the inflammation thus excited are unavailing, unless the exciting cause of it be removed, the chief object of attention ought to be the obtaining this removal. This may be accomplished in two ways, viz., either by removing a portion of the nail, down to its root, on the side where it grows in, or by so thinning the nail along its middle, from the root to the end, that it, in consequence, becomes quite yielding, and no longer exerts any undue pressure at the sides. As the first of these operations, to be properly performed, requires a skilful surgeon, it will be needless to detail it here. But the second may be easily performed by the patient himself, or by any one possessed of a little dexterity and lightness of hand. The thinning is to be perfectly and completely

accomplished throughout the entire length of the middle of the nail, from the root to its end, by carefully and nicely scraping it with a penknife, or the sharp edge of a piece of glass, until it becomes as thin as writing-paper, and readily yields to the slightest degree of pressure. All pressure on the irritable surface of the sore being now removed, it will speedily heal under simple dressing with the calamine or zinc ointment. It will be afterwards a useful precaution to allow the nail to remain rather long at the end, instead of being closely pared, and the shoes of course, if it be desired to avoid a recurrence of the annoyance, ought always to be worn easy and roomy at the toes.

CORNS.—These are formed by a thickening and hardening of the scarf skin or cuticle, caused by pressure, which preternaturally excites the secreting action of the true skin or cutis. When the corn becomes dense and hard, and is much pressed by a tight shoe on the true skin below it, it sometimes causes such a degree of inflammation, that a painful, distressing abscess is the consequence. The proper treatment is to eradicate them by a pointed, flat instrument, blunt on the edge, which enables the operator to remove them without causing any bleeding. The application of the lunar caustic, or nitrate of silver, to the surface of the true skin at the root of the corn, and the averting of all subsequent pressure on the part after this process, will effectually prevent their recurrence. The mere paring of the corn, and then surrounding the toe beyond it, where this can be done, with a ring of soft leather, of such a thickness as to project somewhat higher than the corn, and thus guard it from pressure, will generally cause the corn to disappear gradually in about six weeks, by simple absorption; or three or four rings of thick, soft leather, spread on the under part with soap plaster, being placed one over the other around the corn, and rising a little higher than it, so as to overtop it, and thus guard it from all further pressure, may be employed to produce the same result.

Corns are not always hard, but, on the contrary, are sometimes soft, white and moist, which is particularly apt to be the case when occurring, as they occasionally do, on the side of the toes, so as to be subjected to pressure from the adjoining toe, and to the abundant transpiration which so constantly prevails there. These frequently prove much more troublesome than the others, and are much less manageable as to treatment. They spread more than the hard corn, cannot be so entirely removed, and are liable to inflame, to suppurate, and cause painful, obstinate sores, if not treated early with due care and attention. Careful paring of the corn, and astringent applications, such as ten grains of sulphate of zinc to twelve ounces of water, or equal parts of alum and white of eggs, prove very alleviating. Absolute rest ought to be conjoined with this treatment, to render it effective.

WARTS.—These are most frequently seen on the hands and face. They occur most frequently on the former in childhood and up to the period of puberty, after which they are but rarely observed. In this situation they not only cause

deformity, but sometimes impede the movements of the fingers. They disfigure and deform the face when occurring there, and in advanced age, either from irritation, or sometimes from no apparent cause, they are liable to assume a cancerous disposition, and cause much suffering. Lunar caustic is well known as a very common application for removing them; but, if they are on the face, it will be prudent to use a milder and less irritating remedy, such as strong acetic acid, which may be applied every second or third day, to excite their absorption and consequent removal. Should a wart on the face become itchy, painful, and indurated, the sooner it is excised the better.

GANGLION.—This is a small hard tumour, free from pain, and composed of a sack or cyst of a firm tendinous texture, connected with a subjacent tendon, and filled with a glairy fluid, like the white of an egg, which is sometimes, however, quite watery. It is generally more or less movable below the skin, of a round, smooth, even form, varying in size from a pea to a pigeon's egg, but most commonly about the bulk of a hazel nut. It is of slow growth, but seldom inflames, and still more rarely suppurates. When suppuration occurs in it, a foul, ill-conditioned ulcer is apt to be the consequence. Ganglions occur most frequently over the tendons which extend the wrist, or on those which bend the ankle-joint. They cause deformity rather than inconvenience, but are sometimes accompanied with a feeling of weakness in the part. Sometimes they are produced by a bruise or sprain, and are commonly designated among work-people as sprung-sinews, but nothing is ascertained as to their usual cause.

The best and most simple mode of removing ganglions of the ordinary moderate size is by rupturing the sack, either by a smart blow with a book, or by strong pressure with the thumbs. By this means the fluid contained in them is dispersed among the surrounding parts, and is there absorbed. To promote this absorption, a bit of cork, or a piece of money enveloped in lint, should be bound on the part afterwards, and so secured by a bandage as to exert a considerable degree of compression, which is to be continued for some days. Sometimes the cyst or sack is too strong to be burst in this manner, in which case the skin may be drawn to one side, and a puncture made in the tumour by a large needle. When the contents have been thus removed, the compress and bandage mentioned above ought to be applied. When ganglions are of large size, it will be advisable to let them alone until proper medical advice can be procured.

RUPTURE OF THE TENDON OF THE HEEL.—This large, thick tendon, technically called the tendon of Achilles, which connects the heel with the powerful muscles that form the calf of the leg, is sometimes suddenly snapped asunder, in consequence of violent exertion of the body, as in leaping, or attempting to avoid falling. We* have known this accident to occur to an old gentleman of nearly eighty, who, on a festive occasion, was so imprudent as to renew his

* The writer of this Chapter.

homage to the goddess Terpsichore in a few mirthful capers. It is also apt to occur from making a false step in walking, or in descending a staircase. The sensation of the patient, on such an occasion, is as if he had received a sudden violent blow on the part from a blunt instrument, while his heel seems to him to have sunk into a hole, and he and those near him occasionally hear a sound as of a cord suddenly rent asunder. Most frequently, the patient, on receipt of the injury, drops instantly to the ground, as if shot. The mode of treatment consists in keeping the knee bent and the ankle joint extended, so as to relax the muscles of the calf of the leg, and allow the ends of the divided tendon to be in juxtaposition. The most convenient apparatus for this purpose is a slipper with a strap and buckle at the heel, and a well-padded collar to be placed round the thigh immediately above the knee, to which the strap of the slipper is to be fastened. At the same time, a compress, or small pad of folded lint, should be placed on each side of the divided tendon, and confined by a roller, the pressure of which ought not to be more than such as is necessary to retain the pads in their position. The apparatus ought to be worn for three or four weeks, as a complete reunion cannot be counted upon at an earlier period. As, however, a much longer period is required to enable the injured part to acquire the force and vigour necessary to support and resist the continual powerful action to which it is liable to be subjected, the patient ought to be extremely careful in not over-exerting the limb on first using it, and to wear for some time a high-heeled shoe, to prevent overstraining of the tendon.

DIVISION OF THE TENDON OF ACHILLES BY A CUT.—This is an accident that sometimes happens to mowers when working too closely to each other, and to carpenters from the accidental slipping of the adze with which they may be smoothing a piece on which they are resting one foot.

For treating the cut tendon, the same apparatus as that employed for the ruptured tendon may be used, but somewhat modified, to avert hurtful pressure on the wound. Thus, a little more projection may be given to the part of the heel of the slipper where the strap is attached, so as to prevent it from pressing on the wound as it passes over it. As the loose skin, when the two ends of the tendon are brought together, is apt to get insinuated between the edges of the wound, it will be well to put in two or more stitches with a silk thread. In doing this, the two edges of skin should be pinched up so as to bring their under surfaces in contact, and the needle and thread be passed through both together at about a fifth of an inch from the edge. Slips of adhesive plaster ought to be applied between the stitches, to aid still farther in keeping the parts in apposition. Should the parts through which the stitches pass become irritated and inflamed at the end of two or three days, the stitches must be cut away, as in this case they will only add to the irritation.

PROTRUDING BOWEL.—This is apt to occur in children from bowel com-

plaint which has continued some time, and caused relaxation of the parts about the opening of the bowels. It seems, also, sometimes to be caused by allowing children to sit on a low chair, and strain too long when relieving the bowels, and particularly if these have been permitted to get too much confined. The protrusion is often three or four inches in length, and though it be often returned without much difficulty, and may remain, still, at other times, it may be very difficult to replace it, while it is constantly liable to recur from any slight downward pressure exerted on the bowels. Thus, we have seen a protrusion of the extent of three or four inches, caused by a previous bowel complaint, continually recurring afterwards, in consequence of the cough excited by a supervening bronchitic affection.

The treatment consists in placing the little patient on his back, with the hips somewhat elevated, and then gently pressing the part up with the finger. When the portion of protruded bowel is considerable, and it is difficult to return it, from its having been some time down and got swollen, it will be necessary to lubricate it well with oil, and then, compressing it steadily at the part where it issues from the passage, to endeavour to reintroduce it gradually, portion by portion, as it were, into its place. Should the protruded part be apt to slip down again, a small bit of cork, rounded at one end, should be covered with a piece of linen, and fastened on that part of a T-bandage which passes between the fork of the legs, and applied by means of it over the opening of the bowels, in order to prevent this recurrence. When the child has a motion, he ought to be made to sit on a chair so high as to prevent his feet from touching the ground, and not allowed to remain long on it. It will also be proper to prevent the child from sitting upright, until the bowel has recovered such a degree of tone as to remain in its natural position.

BLISTERING.—As this is a very common and highly useful remedial measure in a great variety of diseases, some of an inflammatory nature, others characterized by pain, either deep-seated or superficial, it is well to know how to prepare and apply a blister, as also how to dress the blistered surface after its removal.

The blister-plaster is to be spread either on white leather, or, what is better, on a piece of adhesive plaster, of the size and form required, a clear, free margin, about a third of an inch in breadth, being left all round it, by which, if the adhesive plaster has been used, it may the more firmly adhere to the part. The blister-plaster is to be spread on the leather, or other recipient, to the thickness of parchment, either by a spatula, common table-knife, or, as is generally done, by the moistened thumb. A heated spatula or knife ought never to be used for this purpose, as it is apt to impair the vesicating quality of the blister-plaster. After its application, it should be gently pressed upon all over, so as to insure its equal and uniform adhesion throughout, and farther secured either by a roller or handkerchief. In adults, its application should be continued for eight, ten,

or twelve hours, to insure its full and due effect. Sometimes even ten or twelve hours more are required for this purpose. In children, however, and more particularly when very young, three or four hours of application is generally sufficient; and if the blister be removed at the end of that period, the skin, though vesication may not yet have taken place, is, notwithstanding, so greatly inflamed that it will ensue, almost to a certainty, two or three hours afterwards, particularly if, on removal of the blister, a warm bread-and-water poultice be applied in its stead. Should a blister be continued on a child longer than the period just mentioned, its effects are not limited to producing vesication only of the scarf skin, but extend to such a degree into the true skin, and excite so violent an inflammation of it, as to destroy it, and cause it to slough. If the child's strength be not such as to enable it to struggle through the constitutional efforts necessary to effect the removal of the slough thus formed, he merely lingers for a few days, and gradually sinks under the fatal effects thus produced by the too long-continued action of the blister. Even when the powers of the little patient's system are such as to avert this dire result, his recovery is always more or less tedious, and an unseemly scar, nearly equal in size to the slough that has been thrown off, remains through life, as indicative of its site. Such a scar on the throat, the upper part of the breast, or back part of the neck, is highly disfiguring in a girl as she grows up, and will then often be a cause of painful, unavailing regret to herself and her parents. After-years may sometimes considerably, or partially, lessen its unseemliness; but, to a certain degree, the mark and discoloration remain unobliterated through life.

It is always proper that patients, or their nurses, should be made aware of the painful effects and inconvenience that frequently occur a few hours after a blister has been applied, under the form of strangury and micturition, which sometimes are so severe as to cause intense agony. For, knowing this, and the means of obviating and removing them, they may thus be often saved several hours of extreme suffering and continual urgent annoyance. To meet such emergencies, it will be well to have a quantity of barley-water, or thin oatmeal gruel, ready prepared, of which the patient must immediately partake on the approach of the painful symptoms alluded to. By drinking copiously of either of these diluents, they will be speedily checked and removed. If it be known before the application of a blister, that the patient has formerly suffered in this manner, the precaution may be adopted of applying a piece of fine tissue paper over the entire surface of the blister ere it be put on. The tissue paper ought to be gently pressed against the blister-plaster by the warm fingers, so as to become thoroughly imbued and penetrated by its greasy matter, and the blister then applied with it thus adhering to it. A blister employed with this appliance is in general not liable to be followed with the painful, distressing annoyance just alluded to. A piece of fine gauze may be used for the tissue paper, spread in like manner

over the blister, when it is to be applied to children or persons of a delicate skin, in order to prevent absorption of the vesicating principle of the blister-plaster, termed cantharadin, and its subsequent irritating effects on the urinary organs. Bathing the part to which a blister is about to be applied with strong vinegar, has the useful effect of causing it to act more speedily and more effectively. Where the circumstances are such as to allow the choosing of a time for the application of a blister, the most opportune is certainly the usual hour of going to bed, for, if then applied, the patient will often enjoy his ordinary sound sleep, and experience neither annoyance nor uneasiness from it until towards morning.

In dressing a blister, it is necessary to preserve entire, as much as possible, the vesicated scarf skin, and merely to snip it slightly here and there with the scissors in the parts most distended by the effused serum, to allow its ready exit. The careful preservation of the scarf skin protects the true skin below from irritation, and thus promotes the more speedy healing of the blistered part. After the serum has been removed from the vesications, a previously prepared dressing of lint or soft linen, pretty thickly spread with cold cream, simple or spermaceti ointment, ought to be immediately applied, and renewed about every four hours during the first two days. A folded soft cloth or napkin may be placed over the dressing, which is to be secured by a convenient bandage. At the end of the second day, the part will seldom require dressing more than twice in the twenty-four hours until perfectly healed. Sometimes, however, it is beneficial to prevent the blister from healing so speedily, by dressing, during the first two or three days, with basilicon ointment; but, after that time, with the spermaceti or simple ointment.

In those cases where sloughing has unfortunately followed the application of a blister, warm bread-and-water poultices, or those of linseed meal, should be applied to promote its removal, and the same treatment observed in other respects as where a similar destruction of the true skin has been caused by a scald or burn.

TOOTH-DRAWING.—This is a very simple mechanical process, and it requires but little art and expertness to perform it in the ordinary and most usual cases in which recourse is to be had to it. It is an art which may be easily acquired, and a little practice and attention to the mode in which the key-instrument acts, will soon impart sufficient manual expertness and dexterity to enable a person residing in a secluded country place, at a distance from all medical aid, to relieve either one of his own family, or a neighbour, by extracting an offending, torturing tooth. A strong inducement for inciting individuals likely to dwell in the wilderness, such as the emigrant or backwoodsman, to attain this art, ought to be the reflection, that he may thereby sometimes be able to enact the gracious part of a truly humane Samaritan to some fellow-being, by relieving him, through it, of the poignant and distressing suffering caused by toothache.

Two instruments are commonly used for extracting teeth, viz., the straight forceps, a kind of pincers, for drawing the front and eye-teeth, and the key or claw-instrument for the molar teeth, or grinders. In drawing an eye-tooth, the forceps are made to grasp all the portion of tooth projecting beyond the gum, and a slight twisting movement from side to side is to be exerted along with the extracting force. This twisting movement, by loosening the root of the tooth from its adhesion to the enclosing socket, adds greatly to the effect of the extractive power.

The extraction of a molar tooth or grinder is a more difficult and complicated process, which is usually executed by the tooth-key. This instrument, with its key or claw, is so well known that it is unnecessary to describe it, or to say more about it than merely to observe, that, in extracting the tooth, it acts simply as a lever; for while the twist or wrench to one side is made by the operator, the resistance acts perpendicularly, so that the tooth is forcibly lifted in a somewhat oblique direction out of its socket. Due care should always be taken, when fixing the instrument, to select the really ailing tooth, for sometimes the awkward, serious mistake is made of extracting a sound, efficient grinder, instead of the decayed, offending one.

To perform the extraction of the tooth, the key of the instrument should be nicely adjusted to the tooth, so as to embrace it close to the gum, whilst the bolster, or fulcrum, rests against the inside of the gum itself; a somewhat quick, circular, or twisting motion from without inwards is then made with the requisite degree of force to complete the operation. As the grinders, or molar teeth, have in general a somewhat slight inclination inwards, it is usually well to make the extraction in that direction; though, at other times, in consequence of the tooth either being placed awry, or so wedged by the two adjoining teeth as to prohibit this mode, it will be better to reverse the procedure, and to extract it in an outward direction. Bleeding from the socket of the extracted tooth sometimes occurs to a troublesome and even alarming extent. The best means of staying it are the application of caustic to the part, and the pressure of a piece of cork rolled in lint. At times, it is even necessary to have recourse to what is termed the actual cautery, namely, a piece of wire bent at a proper angle at one extremity, and applied red-hot to the bleeding surface.

BLOOD-LETTING.—This is a highly important curative means in a great number of diseases, varying much as to their nature and their causes. The bleeding may be either local or general. When the bleeding is local, it is performed either by scarifying, leeching, or cupping. Scarifying consists in making slight incisions in the part inflamed, which must necessarily be superficial to allow of this being done. Such incisions are often beneficial, not merely by the withdrawal of blood, but by relieving the tension of the part. As medical knowledge is required to know when scarification of a superficial inflamed part

is likely to be of service, it ought only to be done when sanctioned by the surgeon.

Leeches are used for abstracting blood locally from parts whence it cannot be drawn by cupping, as, for example, from the abdomen, the fore part of the neck, &c. The part to be leeches ought to be previously carefully washed with warm water, and the leeches should be dried before being applied, by allowing them to creep for a short time over a linen or cotton cloth spread out for that purpose. If it is wished to make them fasten at a particular point, each leech may be put into a cone of paper or linen, so as to permit only the head to project. When they are very shy in fixing, it is often useful to smear the part with a little cream, sugar and water, or sweetened beer. But the most effectual means, in general, is to prick the part with a needle or point of a lancet, so as to draw a drop of blood, which is to be slightly brushed over the place where it is desired that they should fix. When it is wished to make a small number of leeches fasten in close contiguity on a confined spot, they may be applied either by means of a pill-box or wine-glass, which is to be inverted over it. As one can never count with certainty on the whole of the number of leeches ordered fixing, it will always be well to have a few supernumeraries to supply such deficiencies. When the leeches have sucked their fill and dropped off, they should be placed in a plate, and have a pinch of salt sprinkled over them. This speedily causes them to disgorge the blood, after which they may be transferred to a vessel containing plenty of fresh cold water, to free them from the salt; for when left too long in it, or too abundantly besprinkled with it, which is by far too often the case, they are very apt to undergo violent contractions, which are followed by speedy death.

On the leeches having all dropped off, the bleeding from their bites should be encouraged by warm fomentations, or, what is often much better, by applying a warm bread-and-water poultice, which is to be changed every half-hour, until a sufficient quantity of blood is supposed to have been obtained. Immediately before applying the poultice, it will be well to foment the part with warm water and a sponge, so as to clear away any clotted blood that may adhere over the orifices made by the leeches, and prevent the blood from freely oozing from them under the action of the poultice. The advantages resulting to the patient from the poultices are, that they neither fatigue him so much as the fomentations, nor are so likely to expose him to the risk and danger of taking cold.

As instances, well authenticated, have occurred in which the often bleeding from leech-bites has placed not only children, but also grown-up people, in great peril from the extreme exhaustion and sinking of the vital powers produced by it, which have sometimes even terminated fatally, it is proper that people should be made aware of such sad consequences, and be prepared to adopt the proper means for averting and preventing them. This tendency to bleeding in these

cases sometimes depends on a peculiarity of constitution, which indisposes the blood to coagulate so firmly at the orifices or wounds made in the minute blood-vessels by the leech-bites, as to stop the sanguineous circulation through them. One of the best means of checking the bleeding in such emergencies as these, is to pass a needle or pin through the skin, on each side of the bite. The wounded part thus traversed by the needle is then to be raised up, and a strong silk thread tied round it below the needle. This procedure generally succeeds in stopping the bleeding, and is more to be depended on for that purpose than the introducing a finely-pointed piece of lunar caustic into the wound. After three or four days, the thread may be cut and the needle carefully removed. Sometimes, however, in the constitutional peculiarity just mentioned, the bleeding will recur on the removal of the thread and needle. As a last resource in this case, recourse must now be had to the actual cautery, namely, a fine iron-wire heated to a white heat, which is to be thrust into the bottom of the bleeding aperture. This is so effectual a remedy, that those who have had frequent occasion to use it, assert they have never known it to fail in a single instance. This mode of proceeding may seem harsh and even fearful, but it by no means excites the acute pain and severe suffering apprehended, provided the iron be heated white-hot, as it almost instantly destroys sensation in the part. In ordinary cases, the bleeding from the leech-bites is speedily stopped by applying a piece of lint to them, and causing pressure by a roller. Where such pressure cannot be properly exerted, from the soft yielding nature of the part, a small pad or roll of lint may be applied over each leech-bite, and secured by passing over it a slip of adhesive plaster, of such a length as to allow a part to extend on each side of it, to give it a sufficient hold on the skin.

CUPPING.—This is an easy and excellent mode of locally abstracting blood, but it is limited in regard to the parts where it can be employed, nor can the quantity of blood, which is desired, be always obtained from the parts which admit its employment. The apparatus consists of a scarificator, or box containing some lancets, which can be made suddenly to start out by pressing on a spring; of a spirit torch; and of cupping glasses, of two or three sizes. The most convenient form of cupping glass is one that is curved upon itself. Its length is about six inches, its breadth about four, and the mouth about two inches wide. In using it, a piece of paper, or a bit of loose, flocculent cotton, moistened with spirits, being put into it and kindled, the mouth is then applied over the wounds made by the scarificator. This form of glass is preferable in some respects to those of a cylindrical shape, as it allows a much larger quantity of blood to be taken at once without removal, and the wounds are not apt to get clogged by the blood coming in contact with them, as it flows freely down into the pendent, bulging part of the vessel. It is well to observe, with regard to cupping, that, before the operation, the parts selected should be well fomented

with warm water, and carefully guarded from the influence of cold during its performance. One of the cylindrical glasses is then to have the air which it contains rarefied, by being held for a few seconds over the lighted spirit-torch, and quickly transferred to the skin. In consequence of the partial vacuum thus formed in the glass, the part below it immediately begins to swell, and forms a deep red or bluish puffy tumour, projecting into the glass. This is now to be removed, by grasping it with one hand and inclining it to one side, whilst the thumb of the other hand is firmly pressed on the skin near the edge of the glass, to allow the external air to rush in. Immediately afterwards, the scarificator, with the lancets duly set, is to be placed on the swollen part, and the spring being touched, the lancets shoot out and make the requisite incisions. Over these, another glass, having the air within it previously rarefied, is to be immediately placed to receive the blood, now freely oozing through the cuts. When the glass has been filled, as far as the vacuum in it permits, it may be removed, and the wounds being quickly and lightly wiped with a sponge, wrung out of warm water, to clear away any coagula, another glass should be immediately applied to procure more blood if desired. The wounds, which generally cease to bleed on the removal of the cups, may be covered with a piece of adhesive plaster, to guard them from any external irritation.*

As this operation may be sometimes much needed where no cupping instruments are at hand, a little ingenuity may enable a person to perform it in a tolerably effective manner, by somewhat rude and simple means. Thus, the place of the cupping-glass may be supplied by a small tumbler, or wide-mouthed glass-bottle, and if their form be such as to bulge somewhat at the side, so much the better. Even an earthen vessel of a light make, and of a somewhat globular form, may also answer the same purpose. After the blood has been caused to accumulate in the part, by using as a cupping-glass any of the vessels just mentioned, the cuts may be made by a lancet, sharp-pointed knife, or a razor, and the blood drawn from them, by applying over them the substitute cupping-glass, immediately after the air has been rarefied in it, by burning within it a bit of paper, loose cotton, or tow, moistened with spirits.

Sometimes, though very seldom, from the division of some small artery, a somewhat obstinate bleeding may occur from one of the cuts made in cupping, which may then be treated and managed like a bleeding leech-bite, by transfixing the part with a needle, lifting it up, and then passing a thread round it below the needle.

VENESECTION, OR BLEEDING FROM A VEIN.—Though general bleeding, as a remedial measure for removing or averting disease, is neither so commonly, nor, happily, so indiscriminately had recourse to now as formerly, still it is in many

* By far the best cupping glass is one made of gutta percha. It is made to collapse by the hand, and, when applied to the part, allowed to expand. Thus, the spirit-torch is not needed.

cases quite indispensable, while in others it is a most important auxiliary. It is consequently to be recommended to emigrants, clergymen, particularly missionaries, and such as are likely to reside at a distance from ordinary medical aid, to attain the art of opening a vein, as they may thereby often render essential service to those among whom they are residing. Though it be a very simple operation, and of easy performance, it ought never to be practised except by a person who has been properly instructed, and who is consequently well aware that danger may result from its being executed in an incautious or unskilful manner. The veins generally chosen for venesection, are those at the bend of the arm, the external jugular vein, and the veins of the hand or foot.* When venesection is to be performed at the bend of the arm, due care should be taken to avoid selecting the inner branch of the middle vein, behind which the great artery of the arm generally runs. As irregularity, indeed, frequently occurs here in the branching of the arteries, the position of the veins, in regard to these, ought to be ascertained, and none behind which an arterial pulsation is perceptible ought to be chosen. Between one and two inches above the part selected for piercing the vein, the arm is to be bound so tight, by a bandage going twice round it, as to stop the circulation in the veins, without at the same time impeding it in the artery. Pressing the thumb of the left hand on the vein, just below where he is about to puncture it, to keep it from rolling, and the blood from flowing out till he is ready to receive it, the operator, holding the lancet between the thumb and index-finger of the right hand, whilst the other three fingers serve it as a rest, introduces it into the vessel at an angle of about 45° , in regard to the surface of the part and the course of the vein. As soon as the blood appears, he refrains from pushing the instrument more deeply, but advances it a little farther forward to enlarge the puncture in the vein, and, finally, raises the point to make the external wound sufficiently large, which may be about three-eighths of an inch. The pressure of the thumb is then withdrawn, and the blood allowed to flow until the quantity desired be obtained. The bandage is now loosened, and the thumb being placed on the aperture, the blood is to be cleared from the arm with a sponge; and a piece of lint or linen, in three or four folds, and about an inch and a half square, is to be laid over the wound, and secured under a moderate degree of compression by a single turn of the bandage in the form of the figure of eight. The bandage is to remain on for two or three days, and the arm to be kept quiet, to allow the vein to heal, and to avert all risk of the bleeding recurring. When the operator makes too small an opening in bleeding, or when that of the vein does not correspond quite with that of the skin, the blood frequently gets insinuated into the loose cellular substance below the skin, and

* A non-professional person should only try the vein in the arm.

surrounding the vein so as to form a tumour, which is apt to impede the flow of blood, and to prevent the desired quantity from being obtained. This being the sole inconvenience which it causes, it will be prudent to avoid introducing a probe, or any other instrument, in order to remove the obstacle, and make the current of blood again flow freely, as inflammation of the vein would be thereby hazarded. Instead of such interference, it is better to open another vein.

VACCINATION.—It is impossible to over-estimate the beneficial effects which have resulted to mankind at large, from the discovery of this simple safeguard against the fearful ravages of one of the most malignant diseases that afflict the human race. For in every community where the practice of it prevails, the inhabitants may be truly regarded as being thereby spared an incalculable amount of misery and suffering, to which they would be necessarily exposed from small-pox and its consequences, were it not for the immunity guaranteed to them by this so simple and admirable a preventive. When the great and important advantages resulting from vaccination, and the facility with which it may be learned and practised, are duly considered, it may surely be recommended to missionaries and emigrants, who are going to reside abroad in remote, secluded, and new settlements, either ill supplied with medical aid, or altogether destitute of it, to learn to perform it, and also to acquire a knowledge of the nature of the vaccine vesicle in all its relations. They would thus know its characteristic marks, the phases through which it passes, and the time required for its perfect development and maturation; the period at which the lymph of the vesicle attains its highest degree of intensity, and is consequently most fitted for imparting its protective quality; and, finally, the best mode of preserving it for a considerable period, so as to allow of its being conveyed to a great distance without any diminution or deterioration of its active powers. Individuals thus prepared in regard to vaccination, would be enabled, at a very slight cost of time and trouble to themselves, to confer essential benefit on neighbours and other members of the community in which they may reside. When vaccination is to be performed, care should be always taken to procure the lymph which is to be used in its highest state of intensity, so as to insure its acting effectively. As it is now ascertained that the younger the lymph is, or the more recent its secretion, the greater is its intensity, and that it continues equally efficient and powerful from the fifth day of the appearance of the vesicle to the eighth, when it is most abundant, it will be proper to select this period for abstracting it and using it. When the areola, or red discoloration, is formed around the vesicle, the specific matter of the vaccine vesicle becomes mixed with a quantity of serum, such as is produced in common inflammation, and the lymph thus diluted is always less effective than in its concentrated state. As the lymph becomes, after the tenth day, tenacious,

and almost deprived of its fluidity, it is now no longer to be relied on. The lymph obtained from adults is considered by many as being less to be depended on than that which has been abstracted from infants. The part generally chosen for vaccination is the outer part of the upper arm, about midway between the top of the shoulder and the elbow-joint. In female infants, however, it is better to perform it about an inch and a half or so below the top of the shoulder, so that the scar left by the vesicle may be always covered by the clothing when the individual has arrived at adult years. The lancet used ought to be very sharp, and when the lymph is to be taken fresh from the arm of a child close at hand, the lancet should be carefully introduced into the vesicle, and brought out charged with lymph, without causing any bleeding. The operator, having thus charged his lancet, proceeds to hold the skin of the part of the child's arm, where he is about to make the punctures, quite tense between the thumb and index-finger of the left hand, and, sloping the lancet as he holds it, he makes a puncture from above downwards, of such a depth as to extend somewhat into the true skin, so that the lymph may be brought into direct contact with its absorbing surface. Any little bleeding that may follow will be of no consequence, and no fear need be entertained that it will wash out the vaccine matter. Two punctures in each arm are quite sufficient, and many medical practitioners limit the number to two on one arm. The punctures should be at such a distance from each other as not to coalesce while advancing to maturation.* A slight redness may be distinguished around the puncture by the aid of the microscope, so early as the second day after the vaccination; but, on the third day, this redness is clearly displayed to the naked eye. By the fifth day, a vesicle appears of a pearl colour, containing a minute quantity of a thin and perfectly transparent fluid. It is of an oval or circular form, according as the puncture has been made. By the eighth day, the vesicle has attained its perfect maturity, having its margin discoloured, and somewhat raised above the surrounding skin, while its colour is pearly or yellowish, and there is an indentation in the centre resembling that on a pustule of small-pox. On the eleventh day, the areola, or inflammatory discoloration of the skin surrounding the vesicle, begins to fade, leaving, as it disappears, two or three concentric circles of a bluish tint. The contents of the vesicle now become opaque, whilst it dries up, and forms scab of a brown colour and rounded form. This scab gradually hardens and blackens, and finally falls off between the eighteenth and twenty-first day, leaving behind it a scar, proportioned, as to size and form, to the previous inflammation. In many cases, the scar, however perfect, entirely disappears as

* The easiest and most effectual way of vaccinating, is to make the virus into a paste with a little water, to spread about the size of a shilling of it over the arm, and then make a few slight scratches.

life advances. The constitution is seldom affected during the progress of the vaccine vesicle until the eighth day, when the infant usually becomes rather restless and uneasy. The skin is hot, the digestive organs deranged, and the sleep is broken and disturbed at night. These indications of general disturbance of the system continue for two or three days, and vary greatly in different cases; for some infants have their general health slightly impaired during the whole period of vaccination, while others have scarcely a symptom of fever, though the inflammatory blush around the vesicle may be extensive, and the formation of lymph copious. Various modes have been suggested and recommended for preserving and conveying the vaccine lymph to a great distance. It is not necessary to notice more than two of these, which are most generally employed, and found well adapted for that purpose. The first is the ivory-point, in shape like a very narrow lancet, about an inch long, and half a line in thickness. The vesicle being gently punctured by a lancet, the point is then introduced into it, in order to become charged or armed with lymph, after which it is carefully dried. These points, when prepared with due care, are very effective, being found to retain their activity in this climate for many months, and also to answer well as a sure mode of conveying lymph to distant places abroad. The second mode consists in placing the charge of vaccine lymph between two square pieces of glass, about two-thirds of an inch in size, which are then closely enveloped in a bit of tinfoil, to preserve the lymph from the action of the air. When vaccination is to be performed with an ivory-point, it must be first breathed on a few times, that the dried lymph may be moistened, and then inserted into the puncture previously made with a lancet, and there gently pressed upon, so as to transfer the lymph from the point to the interior of the puncture.

When the charge preserved between the glasses is to be used in vaccinating, it must be breathed on several times to moisten it, and permit of its being transferred to the point of a lancet, which is rubbed upon it for that purpose. The lancet, when thought to be duly armed in this manner, is then used for making the vaccine puncture in the mode already mentioned.

Care should be taken to prevent the vesicle from being injured or broken, so that its progress may be clearly ascertained, and assurance at the same time obtained, that it has duly gone through its normal course.

ON LANCING THE GUMS.—Young children often suffer severe and general disturbance of the system when cutting their first teeth. This is indicated by restlessness, fretfulness, and feverishness, which are frequently succeeded by convulsion-fits. These fits are dependent on irritation of the nervous system, which sometimes either proves suddenly fatal, or lays the foundation of dangerous organic disease.

Irritation from teething is indicated by the saliva constantly drivelling

from the child's mouth, by his continually putting his fingers in it, and by biting his gum-rubber, or any hard substance which he can get hold of. On examining the gums, the part where the tooth is about to cut is swollen, redder than usual, hot and tender to the touch, so that the child cries if it be pressed upon. Lancing the gum, under these circumstances, is often productive of great relief to the little sufferer, as it empties the inflamed part of its blood, removes tension, and thus alleviates pain and inflammation. Even though the tooth should not immediately appear after lancing of the gums, and the incision heal up, and a scar form over it, still the tooth will more readily protrude afterwards at this part than if the gum had been allowed to remain sound, which ought to be an additional inducement to have recourse to this operation, whenever a child seems to be suffering more than ordinary uneasiness and general irritation during teething. As lancing the gum is an extremely simple operation, and requires to be seen only once or twice to enable any person, possessed of the ordinary dexterity of hand, to perform it effectually, it would be well for parents residing in secluded districts, remote from medical aid, to learn to do it, as they may thereby at times have it in their power to snatch a child from the most imminent peril, and prolong its existence.

A gum-scarifier is usually used for lancing the gums. In performing the operation, the instrument is to be placed perpendicularly on the part to be lanced, and an incision first made down to the cutting tooth in the direction of the gum, and then another incision across the gum, and at a right angle with the former one, which will complete the object in view, and often, in the space of two or three hours, afford the most marvellous relief to the little patient, who, instead of being languid, peevish, and irritable, and giving other indications of general uneasiness and suffering, now becomes cheerful and lively.

VARICOSE VEINS.—The varicose or swollen state of the veins consists in their becoming dilated, thickened, and elongated, so as to form an irregular, tortuous swelling, which deforms the limb, and, at the same time, weakens it by impeding the circulation. They give rise also to uneasy sensations in the limb, rendering it heavy and painful, so that walking becomes wearisome and difficult. The veins in this state are liable to chronic or slow inflammation, to ulcerate, and to bleed. The veins of the leg are those most commonly affected; but the morbid, altered state of these sometimes extends up the thigh to the groin, so that the entire limb is covered, more or less completely, with a sort of irregular network of enlarged knotty-like vessels. It is generally in grown-up people that varicose veins occur in the lower extremities. Among these, too, it is commonly those that are tall of stature, and have large veins, who are most predisposed to the disease. The causes which more immediately excite this morbid state, are long-continued standing and sedentary

occupations. The treatment of varicose veins consists in removing or obviating the exciting causes; constipation ought, in particular, to be counteracted. The horizontal posture ought to be indulged in as much as may be convenient, and standing long erect avoided as much as possible. In addition to these means, a bandage or lace-stockings should be constantly worn. If the disease be confined to the leg, the bandage or roller to be employed should be about six yards long and three inches broad, made of moderately stout calico, from which the stiffening has been removed by washing. It is to be applied at the toes, and continued along the leg as far as just above the knee. Should the veins be affected in their course up the thigh, it will be proper to tack to this roller another of the same length, which is to be carried up to the groin, and to make two or three turns round the hips to secure it from slipping down. The roller ought always to be applied before leaving bed, and while the limb is in the horizontal position.

When a varicose vein bleeds, which is generally the consequence of ulceration, the blood sometimes spurts out in a lively jet, so that a considerable quantity is soon lost. This is readily arrested, by placing the patient in the horizontal posture, and pressing on the part with the finger. A little pad of lint is then to be placed over the bleeding aperture, which is to be secured by the roller, that is now to be applied in the manner just mentioned, from the toes to above the knee. If ulceration occurs along with the bleeding, the ulcer must be treated according as it may exhibit an indolent or irritable disposition. If neither of these dispositions oppose its healing, a small pad of lint, soaked in some stimulating lotion, may be placed on the ulcer, with a piece of oiled silk over it, and the roller then applied round the whole of the leg. This dressing may be renewed once in the twenty-four hours, until the part heals. Repose, in the recumbent position, either on a sofa or in bed, will sometimes be useful as an adjunct to the treatment just mentioned.

RUPTURES.—A rupture, or, in technical language, a hernia, is a protrusion of the viscera of the abdomen through the sides of their containing cavity, while the integuments covering the part remain entire. Rupture may take place at almost any part of the abdomen, but it occurs most frequently through the openings which naturally exist in it for the passage of bloodvessels. These openings are technically called canals, and named according to their situation: thus, that in the groin is termed the inguinal; that at the top of the thigh, the femoral; and the one at the navel, the umbilical canal; and the ruptures or hernial protrusions occurring at these apertures are respectively named, Inguinal, Femoral, and Umbilical.

The causes of rupture may be distinguished into those which predispose to it, and those which immediately cause it. Among the former are certain circumstances which lessen the resistance opposed to the escape of the viscera.

The resistance alluded to is also remarkably diminished by emaciation and relaxation of the body, whilst a natural peculiarity of structure predisposes some persons more than others to the disease. The exciting causes operate by calling into action, on the viscera of the abdomen, a greater than usual expulsive force. Thus labouring people are particularly liable to the disease, from the great exertions which they are often called upon to make in lifting or dragging heavy weights; for, during these, the viscera are compressed between the diaphragm and abdominal muscles, and so violently impelled against the whole surface of the cavity, that, should there be any weak part in it, a protrusion is there apt to take place. Jumping is also apt to cause the disease, and tight articles of dress, which compress the abdomen, and still farther confine its contents, without affording increased support to the parts near the natural apertures. Standing on tiptoe, and attempting to reach to something with the arms extended above the head, or pushing with them in that position against anything with considerable force, frequently brings on rupture.

The symptoms of a rupture can only be properly described or understood by separately considering three different states in which the disease may exist. In the first of these, the rupture is said to be "reducible," because the viscera return into the abdomen when the patient is placed in a recumbent posture, or when moderate pressure is applied to the tumour. In the second state, the rupture is termed "incarcerated," because the viscera are detained in the sac without causing any further inconvenience. In the third state, the rupture is said to be "strangulated," as the viscera are not only detained in the sac, but are subjected in it to such pressure or constriction as produces inflammation.

The symptoms of a reducible rupture are, a colourless, elastic, compressible tumour, which disappears on the patient lying down, or when moderate pressure is applied. A gurgling noise or sensation can generally be perceived when the viscera return into the abdomen. When the tumour is compressed by the hand, the omentum, or caul, is usually recognized by its doughy consistence, and the coats of the intestine by their elasticity. Various circumstances cause incarceration—namely, thickening and hardening of the caul, or omentum, adhesions between the viscera and the sac, &c. Its situation, and the presence of a colourless elastic tumour of unequal consistence, along with the history of the case, distinguishes the disease. Strangulation depends upon the pressure which is caused by the margin of the apertures. In strangulation, the symptoms are, a twisting, burning pain about the navel, constipation, sickness, and vomiting. The countenance of the patient is anxious, pale, and collapsed. His pulse is small and feeble, his extremities are cold, and he is in incessant agitation. At first there is little pain referred to the seat of the disease; but by-and-by the inflammation extends, and then the tumour becomes red, tense, painful, and tender to the touch. This inflammation may extend

inwardly and prove fatal, like that of the bowels, and of the membrane covering them, arising from any other cause; or it may continue limited to the parts constituting the rupture, and end in their mortification, when the patient either dies, or, if he survive, a preternatural opening of the bowel occurs in the groin. The period required for the completion of this process varies very much in its different stages. Its course is most rapid in young and stout patients, and when the rupture is recent and small. In opposite cases and circumstances, it is commonly more slow; but many exceptions occur, so that it is never possible to predict with certainty the time that may elapse ere inflammation and its consequences shall supervene. Mortification rarely occurs sooner than eight or ten hours, or later than eight days, after the strangulation has begun.

From this account of the nature, causes, and symptoms of rupture, a person who perceives a tumour in the groin or at the navel, which has occurred suddenly on his making some unusual or violent exertion, will scarcely find it at all difficult to form a correct idea as to the true nature of his complaint. Should he place himself in the horizontal posture, and then, by exerting moderate pressure on the swelling, succeed in removing it, in consequence of the viscera returning into the abdomen, he will now feel quite certain that he has really got a rupture. Under these circumstances, he should lose no time in obtaining medical advice and aid. Notwithstanding he may feel no particular uneasiness or pain in the abdomen, or in the situation of the tumour, still he cannot too soon seek the surgeon's assistance, for he may rest assured that delay and procrastination will be pregnant with peril to him. In the time that may intervene before the patient be able to procure medical aid, he ought carefully to avoid all causes of excitement, and every unusual exertion, and keep much in a recumbent posture. Accumulation of the natural secretions in this canal should be also guarded against, and obviated by strict attention to the diet, the use of the enema instrument, or by taking some gentle laxative medicine, such as castor-oil. When a surgeon is called to a case such as that just mentioned, he, of course, desires the patient to procure and wear constantly a rupture-truss, for the purpose of retaining the viscera within the abdomen. It may be observed, that if a young person be desirous of being cured of his rupture (for in advanced age this is not to be expected), he cannot be too attentive to constantly wearing his truss, whether up or in bed; for by so doing, and carefully avoiding all violent exertion, he will generally, should he be under eighteen or twenty years of age, be cured of it in three or four years. During this period, the patient should never remove the truss, unless for a few minutes to cleanse his skin with a sponge, which is to be done in the recumbent position. All who can be at the expense, ought to keep beside them an extra truss, similar in size and strength to the one which they wear, which they may substitute in place of the latter, in case of its break-

ing or needing repair; for otherwise, the going for a day or so without the truss will nullify whatever advantage may have accrued from several months' previous wearing of it, and this lost time must be made up by prolonging its use. During the continuance of a rupture, patients should always be attentive to their diet, both as to kind and quantity, as has been before noticed, and also to keeping the alimentary canal regular and free from accumulation. Persons who exhibit a strong predisposition to rupture, indicated by a fulness perceptible in the groins during the impulse of coughing, and by an uneasy painful sensation at the same part, whenever the abdominal contents are subjected to more than usual pressure, as in forcible exertion of the arms, or in loud speaking, may prevent the actual occurrence of rupture by the timely use of an efficient and comfortable truss. Such individuals ought also to pay the same attention to their diet, the regulation of the alimentary canal, and to the avoidance of all sources of excitement, as those who are actually afflicted with hernia.

Treatment of Strangulated Hernia.—As this is accompanied with great suffering and serious and immediate danger, every effort should be made to procure speedy and decisive relief. A surgeon should always, if possible, be obtained, for often it is only by a nice and skilfully performed operation that the life of the patient can be saved. Should the surgeon, however, have to be sought for at a considerable distance, or should it be impossible to procure one, every exertion ought meanwhile to be made to reduce the hernia by a careful manipulation, which is technically named the taxis. The patient should, for this purpose, be placed in a reclining position, with the shoulders and the hips slightly raised, so as to relax the muscular parts of the abdomen, while the thigh of the affected side should be bent upwards and inwards, to cause a still farther relaxation of the parts in the vicinity of the rupture. The hernial tumour is then to be grasped at its neck, and compressed with the points of the fingers and thumb, which at the same time pull it slightly outwards. The bulk of the parts at the ring having been thus diminished, the pressure is to be directed steadily upwards and outwards, in the direction of the inguinal canal, the name of the passage in the groin through which it has descended. When, in consequence of this manipulation, a slight gurgling is heard or felt, or the size of the tumour is sensibly diminished, the reduction may generally be speedily completed. If this attempt fail, some additional means must be resorted to for repeating it, with the probable expectation of obtaining a more successful result. The most useful of these are a copious laxative enema, the warm bath, and bleeding from the arm to the extent of a pint or so, according to the patient's strength. The application of cold to the rupture is sometimes beneficial, and may be tried without causing risk. One of the most convenient means of continuing the application of a uniform

sufficiently low temperature, is a bladder half-filled with ice and water, or muriate of ammonia with an equal quantity of nitre. After the alimentary canal has been thus, if possible, relieved, and the spasmodic tension of the abdominal muscles removed or lessened, the reduction by manipulation may again be tried. If failure should again follow this renewed attempt, recourse may be had to the powerfully depressing effect of an enema of tobacco infusion, provided the patient be not very weak from his present suffering, from previous disease, or from age. Not only is the most extreme prostration of strength thus produced, but the abdominal muscles are completely relaxed, and the intestine would seem to be so affected as to favour the reduction. The fact is certain, whatever be the correct explanation of it, that though previous efforts may have failed, the reduction has been accomplished when attempted during the state of exhaustion produced by a tobacco-enema. The infusion ought neither to be too copious nor too potent, to avoid any risk of inducing a fatal depression. Ten grains of tobacco, infused during ten minutes in an imperial pint of water, will form a safe enema, which, if it prove ineffective, may be repeated according as circumstances may indicate. These are the means usually employed by the surgeon to reduce a rupture, and avoid the necessity of having recourse to an operation. In all cases, therefore, when his assistance can either not be obtained, or only after a considerable time shall have elapsed, they ought to be used in the manner that has been detailed.

The situation of the femoral rupture is a little below that of the inguinal hernia, and little more outwardly, just where the large bloodvessels emerge from the abdomen and appear on the thigh. The causes, whether predisposing or exciting, of femoral, are the same as those of the inguinal rupture. The symptoms of femoral are the same as those of inguinal hernia; but the bad consequences of strangulation, when it occurs, are observed to be very severe and rapid in their progress, owing to the small size of the protruded portion of intestine, and the extreme tightness of the stricture.

The treatment of femoral ought to be conducted according to the same principles as those which have been mentioned in regard to inguinal hernia. Where it is reducible, a nicely and accurately adjusted truss should be carefully worn afterwards. In case of strangulation, the same manipulation and subsidiary means are to be employed as have been already detailed. Where a hernia, whether inguinal or femoral, has become incarcerated from adhesions between the viscera and the sac, or other causes, it should be prevented as much as possible from increasing by the support of a bag-truss.

UMBILICAL HERNIA, OR RUPTURE AT THE NAVEL.—This is a protrusion of a portion of the abdominal viscera through the umbilical opening, or passage for the bloodvessels of the fetus. It can only occur shortly after birth, as the aperture of the navel becomes afterwards closed, and occupied by a firm unyield-

ing cicatrix or scar. Rupture sometimes occurs in the adult near the navel, but then it always takes place through a preternatural opening, and is said to be ventral. A true umbilical hernia, in a grown-up person, is always congenital.

In the treatment of this kind of rupture, it is of great importance that it should be reduced, and kept so, whilst the aperture still retains its tendency to close and become obliterated, so that the cure may be radically effected, and the patient thus saved from the necessity of wearing a bandage throughout life. This may be easily effected in children, where there is a mere relaxation of the umbilical aperture without any malformation, by returning the protruded viscera, and then placing a piece of rounded cork, enveloped in lint, upon the aperture, of a size sufficiently large to cover it, yet not to go completely into it, which is to be secured in that position by applying cross straps of adhesive plaster. This is a better mode of securing the compress in its place than by employing a circular bandage for that purpose, as it inevitably compresses the general cavity of the abdomen, and thus, though it counteracts the predisposition by giving support, tends to excite the disease. In adults, as such simple means are insufficient, pressure of a more powerful kind is necessary, and is best effected by an apparatus consisting of two broad circular cushions, one to be placed on the back, and the other over the seat of the hernia, the two being connected by a spring having any requisite degree of force. This bandage may be farther secured, should it be necessary, by straps passed over the shoulders.

Umbilical hernia, when incarcerated or strangulated, should be treated on the same principles as those which have been detailed in regard to other hernias.

BANDAGES.—Though the proper application of a bandage to an injured part, or swathing a bad leg with a roller, may seem a very simple affair, and of the most easy accomplishment; still, whoever, under such an idea, attempts it for the first time, will certainly find himself deceived as to its supposed facility, and become convinced that, in many cases, the effective adjustment of a bandage does really require some little cunning of hand. It is an art, indeed, which, to be properly exercised, requires considerable dexterity and nicety, and these can only be gained by practice. Nor are these alone always sufficient, for sometimes not a little ingenuity is required in the adjustment of a bandage, so as to overcome various obstacles, and to render it suitable to the exigencies of a particular case. Where persons have an opportunity of acquiring a little knowledge and dexterity in regard to the application of bandages, they will do well to avail themselves of it, for they may thereby be enabled, at certain times, to do service to neighbours and others, should they happen to reside in a place where surgical aid is distant, and, consequently, often difficult to be procured so soon as could be wished.

The usual material for bandages or rollers is moderately stout calico, which ought always to be washed before being employed, to free it from the stiffening which pervades its texture as it comes from the shop, and which prevents it from lying closely and smoothly on the part to which it is applied. There is a still better article, but which is much more expensive, made of a kind of cotton-stocking texture, so yielding and elastic as to render superfluous many of the twists and turns that are indispensable in applying the usual calico roller. The breadth of a roller should be about three inches, while the length must vary according to the size of the part to which it is to be applied. The usual length of a roller for the leg is five or six yards. When the thigh is to be rolled along with the leg, as is sometimes the case in the treatment of varicose veins, the rollers will have to be double this length. Instead, however, of having a single roller about twelve yards long, which would be awkward and cumbersome to use, it is better to have two separate rollers of six yards each in length, one for the leg, and the other for the thigh. The latter is to be tacked to the former one when it is used up, so as to become a continuation of it.

Two forms of rollers are usually employed—namely, the single and the double-headed roller. The former, which is most convenient, and, consequently, by far the most frequently used, is so called from being rolled from one end only; while the latter is rolled from both ends, so as to form two rolls which meet in the middle, whence it is named double-headed.

The roller is very serviceable in the treatment of ulcers and varicose veins of the legs. In the latter disease it is very effective in checking and controlling the further enlargement of the veins, by imparting the necessary support to them, and thus promoting the circulation through them. Whenever the roller is used for the purpose of supporting and promoting the circulation in the extremities, it must be applied in an even spiral manner, each successive layer or turn over-lapping one half of the preceding one, from the lowest point of the limb to the top. In rolling the leg, two or three turns of the roller are first to be made over each other at the root of the toes, to give it a firm hold of the part. It is then to be wound spirally up the foot, making each successive turn over half of the preceding one. Whilst it ascends on the instep, the roller must be several times reversed upon itself to cause it to sit smooth and easy on the part; and, on reaching the top of the instep, it will require to be carried twice round the ankle, and back again over the instep, forming a figure of eight, the better to secure it from slipping, and to accommodate it for proceeding up the leg. On approaching the rise of the calf, the roller must be again several times reversed on itself to adapt the turns to the part, so as to lie evenly, and cause a uniform, equable pressure upon it. When it has arrived at the knee, and is not intended to be carried further, two or three turns, one upon the other, should be made previous to its being fastened.

Should the roller have to be continued above the knee, it will necessary to pass it behind the joint, around the thigh, and down again behind the joint to the leg, so as to form the figure eight, the crucial part of which is in the ham—and this figure is to be repeated: after which, two or three turns are to be made over each other round the thigh immediately above the knee, when it is again to be applied spirally, and so continued to the top of the thigh. By making the figure eight at the knee-joint, the cap of the knee remains, in consequence, uncovered, which is necessary, as the roller is thus made to sit well round the part, and is less apt to shift or slip. When the roller has reached the groin, the two or three last turns should be tacked together, and a couple of turns then made round the hips, which are also to be tacked to the roller on the thigh, to prevent it from slipping down.

To roll the fore-arm or the upper arm is much more easy than rolling the leg, as it is very seldom necessary to reverse the roller in so doing. It is often from the wrist that the rolling is begun in this case, though sometimes, also, from the ends of the fingers. As the fingers and hand sometimes become puffy and uneasy, it is occasionally necessary to roll each finger separately with a narrow bandage, and then to roll the hand itself to the wrist, whence the rolling is to be continued up the arm.

When the chest or abdomen is to be rolled, a flannel bandage is generally used, six or eight inches broad and five or six yards long. This bandage is applied spirally up and down until it be exhausted. It will be well to tack the first two or three turns before advancing farther, as otherwise the roller is apt to get soon loose.

The T-Bandage is very useful for retaining in their place poultices and other applications, required for boils or abscesses situated about the groins. It is very simple and easily made. Its shape is exactly that of the letter T, hence its name. That part of it which corresponds to the head of the letter is to be fastened round the body, immediately above the hips, and ought to be about four inches broad, while the part answering to the stem of the letter should be six or eight inches broad. One end of the stem piece is to be sewn to the middle of the part that goes round the waist, and ought to be long enough to allow it to pass between the legs, and to be brought up and fastened in front to the belt. This may be done either by dividing its end some way down, and then passing one of these divisions round the belt, and tying the other to it; or the end may be kept entire, and secured to the belt by one or two stitches.

The Looped Bandage.—This is formed of narrow strips of calico, about an inch and a half broad, and long enough, when folded double, to pass round the limb and leave a few inches over. It is secured by passing one of the ends through the loop, and tying it to the other. The number of the pieces to be used will vary according to the length of the limb, as the interval between each

should not exceed three inches. This form of bandage is useful when the degree of tightness requires at times to be altered, and the limb cannot be moved without disadvantage.

The Many-tailed Bandage.—This consists of a longitudinal piece, corresponding to the length of the limb, of the usual breadth of a roller, and of six, eight, ten, or whatever number of transverse pieces the length may require. The tails, or transverse pieces, should be of sufficient length to allow their ends, when carried round the limb, to overlap each other so far as to make them keep their hold, and, when laid across the longitudinal band, each in succession must cover about a half or two-thirds of the one above it, in which position they are to be sewn at their middle to it. When this bandage is to be applied, the limb is gently raised so high as to allow it to be slipped below it lengthwise; the tails are then drawn out and laid regularly on the bed. The lowest tail is then drawn tightly round the limb, and, while its ends are firmly held in that position, the one immediately above it is applied in the same way, so as to secure the former, and thus the whole of the tails are applied in succession until they completely envelop the limb. This bandage possesses the advantage of causing a very equable pressure, and of being easily changed without disturbing the limb; but it does not allow of partial relaxation or tightening, should either the one or the other be desired, as the looped bandage does.

ULCERS.—A common definition of an ulcer is, a solution of continuity in a natural surface-secreting matter.

When a wound does not heal by simple adhesion, or by the first intention, as it is technically termed, it begins, about twenty-four hours after it has been inflicted, to be painful, and to exhibit the other symptoms of inflammation. A thin serous discharge oozes from it, and the surface presently acquires a uniform appearance from an effusion of lymph, which forms a thin superficial covering over it. About the third day—sooner or later, according to the energy of action—the layer of lymph becomes organized, acquires a red colour, bleeds when touched, and, before many days have elapsed, shoots up into small granular projections, whence the process is named. These granulations are small, pointed, firm, and vascular. A filmy pellicle covers them, and they secrete a peculiar thick straw-coloured fluid, called pus, technically, and, in common language, matter. The wound is now, properly speaking, an ulcer. This, however, is only one mode of the production of an ulcer, whereas there are others, which it will also be proper to mention. Thus, an abscess is another cause of an ulcer, when it has burst or been opened. In other cases, an ulcer is the consequence of mortification and the separation of a slough. A bruise, or the irritation caused by the presence of a foreign body in a part, may also give rise to an ulcer, in which case it is attributed to the process termed ulceration, a condition in which the absorbents of the part remove the old particles back

into the system more rapidly than the new ones are laid down by the secerning arteries. The process of healing, in ulcers, is the same, however they may differ in their origin. Thus, the inequality of surface, if such existed, gradually disappears, the bottom of the ulcer becomes regularly concave, and at length it comes to be on a level with the surrounding parts. While these changes are taking place, the extent of the breach is daily diminishing, in consequence of a general contraction of the surface. A delicate blue pellicle is observed at the edge, which increases gradually, and at last covers the small portion of the ulcer that is not closed by the contraction just mentioned. The skin thus newly formed is named the cicatrix, or scar, and it is, of course, always much smaller in extent than the original breach of continuity, and, in the course of time, lessens still farther. It is, at first, blue or purple, and highly vascular, but afterwards ceases to be so, becoming dense, white, and bloodless, whilst it continues still farther to contract.

Treatment of Ulcers tending to heal.—When the granulating process proceeds as has been described, no other local treatment is necessary than such as may prevent it from being disturbed by external irritation. Strict attention to cleanliness should be observed in regard to the parts around the sore, which ought to be frequently washed, and shaved, if there are any hairs on them. It is never either useful or proper to rub the surface of the ulcer itself, as is frequently done, for the pus or matter affords a natural covering to protect it, and would be sufficient for the purpose were not some artificial covering required solely to avoid the risk of injury from contact with external bodies, and the impropriety of exposing an ulcer to view. Old linen, lint, or charpie, may be used for this purpose. Perhaps the charpie is the best of these, as, from being more porous, it allows the pus to pass readily through its interstices, while the others must have small perforations made in them to allow this. Whatever be the covering employed, it should be either spread with some unctuous substance—to prevent it from adhering to any part of the ulcer, and thus cause injury on being removed—or moistened with water, and hindered from drying by a piece of oiled silk laid over it. The ulcer ought to be frequently dressed, in proportion to the quantity of discharge. Once in twenty-four hours is, in general, sufficient, but twice is often necessary. Sometimes an interval of two or more days may intervene between each dressing.

Treatment of Ulcers not tending to heal.—Many different circumstances prevent ulcers from healing; but Professor Syme has very much simplified the arrangement of ulcers in regard to these, by referring them to the three following heads:—

1. Ulcers which are prevented from healing by defect of action.
2. Ulcers which are prevented from healing by excess of action.
3. Ulcers which are prevented from healing by peculiarity of action.

Ulcers prevented from healing by defect of action.—Sometimes a real want of power, and, at others, a want of disposition to exert the power which exists, may cause this defect of action. Ulcers of this kind have, therefore, been divided into weak, and indolent, or callous, which exhibit different characters, and require different treatment.

The surface in weak ulcers is, in general, higher than that of the surrounding skin, while the granulations are large and flabby, of a dark purplish colour, or pale and swollen. Its edge is smooth and flat, or gently rounded; the discharge thin, watery, and generally profuse; the pain is usually trifling, or altogether wanting. The parts around and below it are soft. This sort of ulcer occurs in parts having either weak powers of action of themselves, or from the state of the system. The weakness dependent on the system is most common in children, but may be caused at any age by insufficient nourishment, unhealthy air, &c.

The treatment of weak ulcers consists in the local employment of stimulating and astringent applications with pressure, and, when necessary, in strengthening the system by giving wine, tonics, and nourishing diet. When the healing of the ulcer is opposed by constitutional weakness of action, the internal use of the tincture of cantharides, in the dose of ten drops, twice or thrice a day, will be found useful. The local applications may consist of solutions of the sulphate of zinc, acetate of lead, and sulphate of copper, in the proportion of from one to three grains to the ounce of water. Even water alone answers very well for this purpose, and seems to be about as effectual as the metallic solutions just mentioned. These washes or solutions should now and then be varied, as habit lessens their effect. With the same view, a poultice may be applied from time to time. Pressure, exerted by proper bandages, is always useful. Several folds of lint, moistened with the solution, should be laid over the sore, and thin sheet-lead, such as tea-chests are lined with, cut to the size of it, and placed over the lint, is also very advantageous. Between the lint and bandage a piece of oiled silk should be interposed, to prevent the lotion from too rapidly drying up.

The indolent or callous ulcer has generally a depressed surface, which is smooth and without any appearance of granulations, varying in colour, being brown, grey, or white, and looking as if glazed or varnished. In form it is circular or oval, only slightly irregular, with raised white edges, as if formed of thickened scarf skin. There is no circumscribed hardness immediately around the ulcer, but there is always a considerable diffused swelling of the limb in which it is situated. This swelling is firm and incompressible. The pain varies very much. So long as the sore continues thus indolent, there is no appearance of new skin forming on it. Ulcers of this nature occur chiefly in the legs of people advanced beyond middle age, and are very troublesome to manage, being very apt to recur after they have healed.

The treatment considered as most useful is, rest in the horizontal posture, accompanied with pressure. The latter is effected by the roller and slips of adhesive plaster. The slips of plaster should be an inch or two broad, and long enough, when drawn round the limb, to overlap far enough to keep a firm hold. Before applying them, the limb is to be shaved; a slip of plaster is then applied an inch or two below the sore; another succeeds it a little farther up, so as to leave about a third of the first one uncovered, and thus they are to be applied in succession, until, not only the ulcer, but an inch of the skin above it, is covered. Afterwards, a cotton roller, three inches broad, and five or six yards long, is to be applied from the toes up to the knee. If pain occur, the dressing may be soaked with cold water. The dressing need not be renewed oftener than once in two days, unless the discharge be profuse. Under this treatment the swelling of the limb abates, the callous edges of the ulcer soon disappear, granulations now arise, accompanied with a purulent discharge, and new skin forms, as in an ordinary healing sore. Professor Syme has found that the application of a large blister, covering the sore and a considerable part of the limb, greatly hastens the cure of these ulcers, and frequently proves sufficient for its completion, without the use of any other means than moist dressings applied afterwards. The immediate effect of this practice is, removal of the swelling, disappearance of the high callous edges, and the surface of the ulcer coming to be on a level with the surrounding skin, while it granulates and skins over. This treatment is also stated to be more speedy and lasting in its effects than the strapping process, and much more economical.

Ulcers prevented from healing by excess of action.—These ulcers have an angry or irritable look, owing to the redness of their surface and that of the surrounding skin. They are generally deep, of a brownish-red colour, and without granulations. In shape they are irregular, with abrupt and usually ragged edges, and their discharge is thin, serous, and often tinged with blood. Sometimes they are superficial, of a regular circular form, and without any redness, except a bright line round their edge; the pain accompanying them is almost always acute, and, so long as they retain their irritable condition, no new skin forms on their surface. These ulcers occur on full, overfed persons, endowed with strong powers of action, and also in weak irritable individuals; but the presence of continued irritation, either direct or indirect, may cause them in any person. Their proper treatment consists in removing all sources of irritation, and using local soothing applications. The best of these are heat and moisture, as afforded by fomentations and poultices. The effects of these may be increased by adding decoctions of poppy-heads, solution of acetate of lead with opium, &c. If the symptoms are severe, scarification of the edges of the ulcer, or leeches, may also be used, but this is very seldom required. When excessive power of action and extreme irritability are present, they must be reduced and allayed

by bleeding, purging, and opium, according to the state of the system. As motion has a powerful influence in causing or increasing irritation in an ulcer, rest should be rigidly enforced when we wish to relieve it from irritation.

Ulcers of this kind sometimes go on increasing and enlarging, becoming, as it is termed, phagedenic. If the excessive action increases to such a height as to destroy the life of the part, it forms what is called a sloughing ulcer. Mercury, when profusely and indiscriminately given in the treatment of venereal affections, frequently excites such irritability as to cause the sore to become phagedenic, and to slough. In crowded ill-ventilated hospitals, sores sometimes assume this sloughing disposition, accompanied with great destruction of the parts, and even fatal effects on the system. This constitutes the disease named hospital gangrene, and is caused by the unhealthy atmosphere exciting preternatural irritability. Removal, therefore, from the deleterious influence of the vitiated air is essential for the successful treatment of this affection. This change to a healthy atmosphere is generally all that is required, and, when effected, is speedily followed by the most beneficial results upon the sores, while the most careful employment of the best remedial means and appliances will be of little avail so long as it is neglected.

Ulcers prevented from healing by peculiarity of action.—These ulcers are such as continue to exist without any local or constitutional irritation being at the same time perceptible, to the influence of which they may be attributed. This morbid disposition may be either limited to the ulcer itself, or it may extend to the system in general; hence sores of this kind may be divided into constitutional and local specific ulcers. A specific ulcer is, in general, distinguished by a hard base and edges, the absence of granulations, and its mode of cicatrizing or forming new skin. It has commonly a grey, yellow, or purple colour; its surface is sometimes deeply excavated, at others raised into fungous growths of a cauliflower appearance. The discharge varies much as to colour, consistence, and quantity, and the pain accompanying it is very variable. It is often observed to be healing and skinning over in one part, while ulceration is extending in another. The treatment will vary according to the nature of the local or general disposition on which the ulcer depends. At first it is generally proper to destroy the surface with caustic, and then to apply the black-wash, made by adding calomel to lime-water, in the proportion of eight or ten grains to each ounce of water. The patient should, at the same time, be put under an alterative course of regimen and medicine.

Care should be always taken not to confound with specific ulcers such as show an obstinacy and peculiarity of disposition from depending on some direct or indirect irritation, which requires only to be removed in order to cause them immediately to display symptoms of healing. The most common cause of irritation, in these cases, proceeds from suppression of the secretions, especially

those of the digestive organs, to remedy which the patient must have his diet and regimen strictly regulated, and be subjected to an alterative course of medicine. The treatment of the ulcer itself will depend upon its condition as to excessive or defective action. In general, lotions will answer best as applications to it, and one of the most useful of these will be the black-wash, or mixture of calomel and lime-water.

When an ulcer depends on the suppression of other habitual discharges, its treatment must be conducted on the same principle, and the particular means employed varied according to circumstances.

FRACTURES.—Previous to describing the usual symptoms and proper treatment of a fractured limb, it may be useful to give a few directions as to the most convenient mode of conveying home a person who has met with such an accident; for, if this be not done with due care and caution, the patient will not only be subjected to additional pain and suffering, but the injury, and, consequently, the danger, may be considerably aggravated. If the arm, for instance, be broken, either above or below the elbow, the first thing to be done is to place it in such a position as will most contribute to the ease and relief of the patient. For this purpose, the fore arm should be put at a right angle with the upper arm, and supported in that position by a handkerchief folded diagonally, so that the broad basis of it shall receive and sustain the arm, from the elbow to the fingers, while the ends are attached round the neck at the point of suspension. The injured arm being thus placed in a comparatively comfortable, easy position, the patient, if his strength and the distance to his residence permit it, had better walk thither, as the hurt limb will be thereby less shaken and pained than by going in a carriage.

When the leg or thigh is broken, locomotion, of course, becomes impossible, and some easy, gentle mode of conveyance must be contrived, which is the least likely to increase the danger from the accident, and to aggravate the agony of the sufferer. Should the accident happen near a house, materials will generally be easily found at hand, out of which a little ingenuity may readily construct a tolerably convenient bier or litter, on which the patient can be borne home more comfortably than in a carriage, and also with less risk of causing any farther harm to the maimed limb. Thus, a light door, window-shutter, or hurdle, littered with some hay, straw, or cloaks and blankets, and supported by a cross-pole at each end, by which it is to be borne, may answer the purpose sufficiently well. This being placed alongside the patient, he is to be gently and cautiously lifted on to it, and the limb then laid in the most natural, easy position, with a pillow, or long straw pad, supporting it on the outside. It will be also advisable to bring the sound limb close to the injured one, and secure it in this position by two or three bandages or handkerchiefs, so that it may support it, and render it less liable to be shaken or moved.

Simple Fracture.—When a fracture occurs without any external wound caused by the protrusion of the end of the broken bone, it is named a simple fracture, and when accompanied by such a wound, a compound fracture.

The symptoms of simple fracture vary exceedingly, according to the bone which is broken, but the following are the most common. Some shortening, deformity, or distortion of the limb; the voluntary motion of it diminished or totally lost; swelling, and, after a time, some discoloration from effused blood; a mobility greater than natural, from external force; pain and spasms of the muscles, caused by the irritation of the sharp ends of the broken bone; and lastly, grating of the rough ends of the bone when rubbed against each other, which is technically termed "crepitus."

Treatment of Fractures.—The sooner a fractured bone is set, after the accident, the better, for the bad effects caused by the continued irritation of the broken ends of the bone are thereby removed. The splints for keeping the limb steady should extend a little beyond both ends of the fractured bones, and be equal in breadth to the diameter of the limb. Thick pasteboard is the best material for splints. These should be well softened before application, by being soaked in hot water, and then lined with flannel, carded tow, lint, or cotton-wad. Two splints, one for each side of the limb, are usually required, and the best bandages for retaining them are the looped bandage, the tailed bandage, and the common roller.

Compound Fractures.—The wound which distinguishes compound from simple fractures constitutes an important difference, in regard to the danger and difficulty of cure attending them. Violent inflammation and fever are apt to occur, terminating in profuse suppuration or gangrene, or death, without any remarkable local change, solely from the consequence of violent constitutional disturbance. These cases are serious in proportion to the size of the wound, or the bruising and tearing of the soft parts. The greatest danger is when a joint is involved in a compound fracture.

Treatment of Compound Fractures.—The great object here is to make the wound heal as soon as possible, and thus to convert the injury into a simple fracture. If the bone projects through the wound, and cannot be easily replaced, a part of it should be removed by the saw or bone-pliers, so as to allow this to be done. The bones should be set as soon as possible, to prevent irritation; and, to keep down inflammation, cloths, wet with cold water, should be assiduously applied until it be either no longer dreaded or have actually begun. The patient must also be bled, and have the alimentary canal well opened, whilst his diet must be of the lightest kind and of the least exciting nature. Antimonial wine may be given to the extent of twenty drops every three or four hours. Should inflammation come on, the cold applications must be changed for poultices and fomentations. The bleeding, it is to be observed, must be

employed with great caution, as the patient, should he get over the immediate danger, will have to support a profuse suppuration. Such means, therefore, as subdue violent action, without causing any persistent weakness of the system, should be preferred. The enema of tobacco infusion, as mentioned under ruptures, administered from time to time, along with the antimonial wine, will prove highly useful. As soon as the inflammatory symptoms subside, the strength must be supported by giving more nutritive diet, and even a little wine or malt liquor, if thought necessary.

Particular Fractures.—Broken Fingers and Toes.—The bones of these, from their shortness and mobility, are seldom liable to be fractured. When, however, such an injury occurs, it is readily detected, and is easily treated, by applying a pasteboard, or thin wooden splint, of the length and breadth of the finger or toe, along the flexible side, which is to be padded with lint, and secured by a narrow roller about an inch wide. The hand should be supported, for three weeks or a month, in a sling. Should there be much stiffness of the finger, after removing the splint, it should be frequently gently moved forwards and backwards, and daily immersed, for some time, in warm water.

Broken Ribs.—A fracture of these is indicated by pain during respiration, resembling a stitch or prick in the injured part. The injury is frequently difficult to be ascertained, from the patient being unable to bear the necessary examination. This is, however, not very essential, as the only disease with which it can be confounded, a bruise of the muscles, requires the same treatment as the fracture. Often, by placing the hand on the hurt part, and desiring the patient to inspire deeply, the broken ends of the bone will be felt grating on each other.

Treatment.—A bandage of three or four folds, and about eight inches broad, should be passed round the chest, and made to sit tight by being secured by three or four ties of tape. A common hand-towel, long enough to go round the chest, and folded to the breadth mentioned, with tape-ties sewed on each end, to enable it to be tightly applied, will be found to be a very excellent bandage. As there is always great risk of inflammation of the lungs being caused by this injury, it will be necessary, should pain, and cough, and high pulse succeed it, to take a pint of blood from the patient, to open the alimentary canal well, and to give twenty drops of antimonial wine every three or four hours. The diet must also be of the lightest kind, consisting of arrow-root, sago, rice, and other farinaceous articles. Except during the first few days, the patient will be more comfortable sitting up than lying in bed.

Fracture of the Clavicle, or Collar-bone.—This fracture, in grown-up persons, is generally readily distinguished by the pain, swelling, mobility, and grating of the broken part, and by the shoulder being depressed, brought nearer to the breast, and projecting more forwards than naturally. In children, from the

lightness of their arms, the displacement is far less striking than in adults, so that, at times, the fracture is not discovered in them, until attention is excited to the swelling which attends reunion. See fig. 4, Plate XIX.

Treatment.—There are two methods of treating this fracture, but it will be sufficient to mention that which is regarded as the most simple and effective. This consists in bracing back the shoulders by a figure-of-eight bandage, or by shoulder-straps, drawn together by any simple contrivance. This obviates the distortion, but the weight of the limb still causes a depression, which is to be remedied by placing the affected arm slantwise across the breast, with the fingers pointing to the top of the opposite shoulder, and confining it, in this position, by a bandage or sling.

Fracture of the Arm above the elbow.—This is readily discovered by the unnatural motion at the fractured part, and the patient's incapacity to raise the fore-arm. See fig. 2, Plate XIX.

Treatment.—This consists, when the fracture, as is most usual, is about the middle of the bone, in applying two pasteboard splints on the inner and outer side of the arm, extending from the armpit and top of the shoulder to the elbow. The splints are to be secured by a simple roller, unless there be much swelling, when the looped bandage will prove more suitable. The elbow should be bent at a right angle, and supported in a sling.

Fracture of the Arm below the elbow.—The nature of the injury is generally easily discovered, by the grating of the broken ends of the bone. In general, only one bone is broken, either the radius or the ulna, and the fracture of both together is a rare occurrence. See fig. 1, Plate XIX.

Treatment.—This consists in applying two pasteboard splints, one extending from the bend of the joint in front, and the other from the point of the elbow behind, to the tips of the fingers, which are to be secured by the simple roller carried from thence up to the bend of the arm. The arm then, resting on its back, is to be placed in a sling, which should sustain it from the elbow to the finger-ends.

Fracture of the Thigh.—When the shaft of the thigh-bone is broken, it is, in general, marked by the usual symptoms of fracture.

Treatment.—This is various, inasmuch as there is considerable difference of opinion among the most eminent surgeons on this point. The promoting the reunion by keeping the limb permanently extended, by the application of the long splint of Desault, is certainly one of the best modes of treatment, and is equally distinguished by its efficiency and simplicity. This splint is a board about four inches broad, of sufficient length to extend from the false ribs to a few inches beyond the sole of the foot, and pierced, at each end, with two holes for fastening the bandages. When about to be applied, the patient's bed is first to be prepared by being made smooth and firm. His limb is then to be

extended, until it corresponds in length and direction with the sound one, in which state a pasteboard splint, duly prepared by being softened and padded, is applied on the inner side of the thigh, extending from the fork between the legs to beyond the knee, and another on the outer side, reaching from the trochanter major (the bony knob at the upper and outer part of the thigh) as far down as the former. The splints should be secured by four or five looped bandages, and the board—previously wrapped in a sheet or tablecloth, of which enough ought to be left to surround the thigh—is then to be laid alongside the limb, and a handkerchief passed under the fork to be tied to its upper end, while the foot is secured to the lower one. By this simple means, retraction is effectually prevented. A bandage of tolerable breadth, or a handkerchief, is to be passed round the patient's waist, to prevent any lateral displacement of the apparatus, while the unfolded part of the sheet lying under the limb is to be brought over it and fastened to the splint, so as to retain the fracture in a perfectly steady position. See figs. 3 and 5, Plate XIX.

Fracture of the Patella, or Knee-cap.—This injury is always very obvious, and is farther indicated by the total loss of power over the joint which attends it. Bony union seldom or never takes place in this case, a merely ligamentous connection being formed, which varies from a few lines to several inches in extent.

Treatment.—Though a complete cure is, in this case, impracticable, still every effort must be made to limit, as much as possible, the ligamentous connection. For this purpose the limb is not only to be perfectly extended, but also somewhat raised by a pillow, to relax the muscle of the thigh, which acts most powerfully on the upper part of the knee-cap. A bandage is then applied, consisting of two pieces of leather, three or four inches broad, and sufficiently long to surround the limb above and below the cap. These are cut out in front to receive the bone, and provided with straps and buckles, so that they may be tightened and drawn together. This bandage must be kept on for a month or six weeks.

DISLOCATIONS.—Great skill is frequently required to detect these, and their reduction is often accomplished with extreme difficulty. Only a slight and rapid sketch will, therefore, be here given of the means by which several of the more common dislocations may frequently be replaced by the efforts of unprofessional persons.

Dislocation of the Arm into the armpit.—When this dislocation has once happened, it is very apt to recur, even from slight causes. The easiest mode of accomplishing the reduction is to make the patient lie upon his back on the floor, with a pillow under his head. The operator then, having taken off his shoe, seats himself alongside the patient, with his feet extended towards the injured shoulder, and places his right or left heel in the armpit, according as

the injury is on the right or left side, grasping, at the same time, the patient's wrist with both hands, and pulling the arm slowly and steadily downwards. Having thus got the arm well extended, he finally bends it inwards over the fulcrum afforded by the foot, when the bone will immediately slip into its socket, with more or less of a kind of snapping sound. See figs. 2, 3, and 6, Plate XX.

Dislocation of the Shoulder forwards.—In this case, the bone is first dislocated downwards, and then farther displaced by the action of the muscles, which draw it upwards and inwards, raising it as far as the collar-bone will permit. The head of the bone thus comes to rest in the hollow space between the breast and shoulder, immediately below the collar-bone. The reduction is effected in the same way as in the dislocation of the arm into the armpit, but it is first generally useful to extend the arm obliquely downwards, in order to remove the bone from the position into which the muscles have drawn it. See fig. 1, Plate XX.

When this accident occurs from slight causes, as it frequently does, unaccompanied with any bruising of the parts, the patient may sometimes succeed in reducing the dislocation himself, if there be at hand a five or six-bar gate. The patient, having laid aside his coat, must pass the dislocated arm over the top bar of the gate, and reaching down as far as he can, firmly grasp one of the lower bars. Having thus placed himself, he must make the upper bar serve as the fulcrum, from which he may suspend more or less of the weight of his body, and thereby cause such an extension of the dislocated arm as shall bring the head of the shoulder-bone into a favourable position for being acted on by the muscles, which are to draw it into its natural position. The replacement of the dislocated bone is generally indicated by a sudden snap, or slight grating sound at the joint. It is almost superfluous to observe, that to insure a successful result in such a case as this, a person must be possessed of strong nerves, and capable of making considerable muscular exertion while enduring severe pain. See fig. 3, Plate XX.

Dislocation of the Elbow-Joint.—This joint is subject to various sorts of dislocation, but the most common of all, and the most readily distinguished, is the displacement of both bones of the fore or lower arm backwards. In this case there is a hard tumour at the bend of the arm, and the limb is, in general, permanently bent. The elbow-bone projects farther behind than usual, and the fore-arm appears shortened, while there is little or no motion at the joint. The replacement is easily effected by first extending, and then bending the fore-arm, while an assistant, clasping the elbow with his hands, so that the fingers rest on the point or extremity of the elbow, and the thumbs on the end of the bone of the upper arm, pushes the dislocated bones into their place. See fig. 4, Plate XX.

Dislocation of the Jaw.—This injury generally occurs in gaping, when, the lower jaw being quickly and violently drawn down, one or both of the condyles, or jointed ends, glide from their sockets, so that the jaw becomes fixed and opened in a painful, unseemly, but most striking position. This dislocation, like that of the shoulder, is very apt to recur, after having once taken place. The reduction is to be effected by introducing one or both thumbs, well wrapped in a piece of rag, into the mouth, and pressing firmly downwards and backwards the jointed-ends of the jaw, while the anterior portion of it is urged upwards. After the replacement, it will be well to pass a bandage once or twice round the top of the head and under the chin, which should be worn for a few days. See fig. 5, Plate XX.

Another mode of reducing dislocation of the jaw is the following :—The patient is to be placed on a low seat, and the operator on one somewhat higher, immediately behind him, and provided with one or two cylindrical pieces of wood, according as one or both condyles may be dislocated. One or two table forks will serve equally well, and these are generally to be found at hand where the accident occurs. The pieces of wood, or hafts of the forks, are then to be introduced by the operator into the mouth on each side, and steady pressure made with them backwards and downwards on the jaw at its articulation as the fulcrum, whilst an assistant who stands over the operator must pass the fingers of both hands, clasped together below the chin, and using it as a lever, press it upwards towards the upper jaw. These combined movements will be sufficient to effect the reduction of the jaw into its socket. See fig. 5, Plate XX.

Dislocation of the Thigh at the hip-joint.—Should there be good reasons for supposing that the thigh is really dislocated, its reduction may be attempted in the same way as that recommended in dislocated shoulder. The patient is to be laid on the floor on his back, with a pillow below his head, and the operator is to sit down beside him, as when reducing a dislocated shoulder. The hips of the patient are to be held steady by assistants, while the operator, having put off his shoe and placed his leg between those of the patient, presses with his foot upon the fork, which must be properly protected by a pad, whilst he grasps the patient's ankle with both hands, and extends the limb with all his power. Whilst he is thus pulling with all his force, he should endeavour to divert the patient's attention by desiring him to alter his position a little, in doing which the opposing muscles may become so relaxed that he may, probably, succeed in effecting the reduction. See fig. 7, Plate XX.

TREATMENT OF PEOPLE APPARENTLY DROWNED.—A great deal of mistaken opinions, and consequently of highly improper practices, even yet prevail regarding the treatment of individuals taken out of the water in a state of insensibility. It was conceived that the water entered the lungs and the stomach, and that its presence there caused death. Accordingly, it was the custom to hold

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



apparently drowned people up by the heels, in order to allow the water to run out. From some similar notion, the patient was (and indeed is yet) rolled about in barrels, &c. The truth is, that no water, at least none sufficient to occasion death or even inconvenience, enters these organs, and the custom of suspending by the heels is highly injurious.

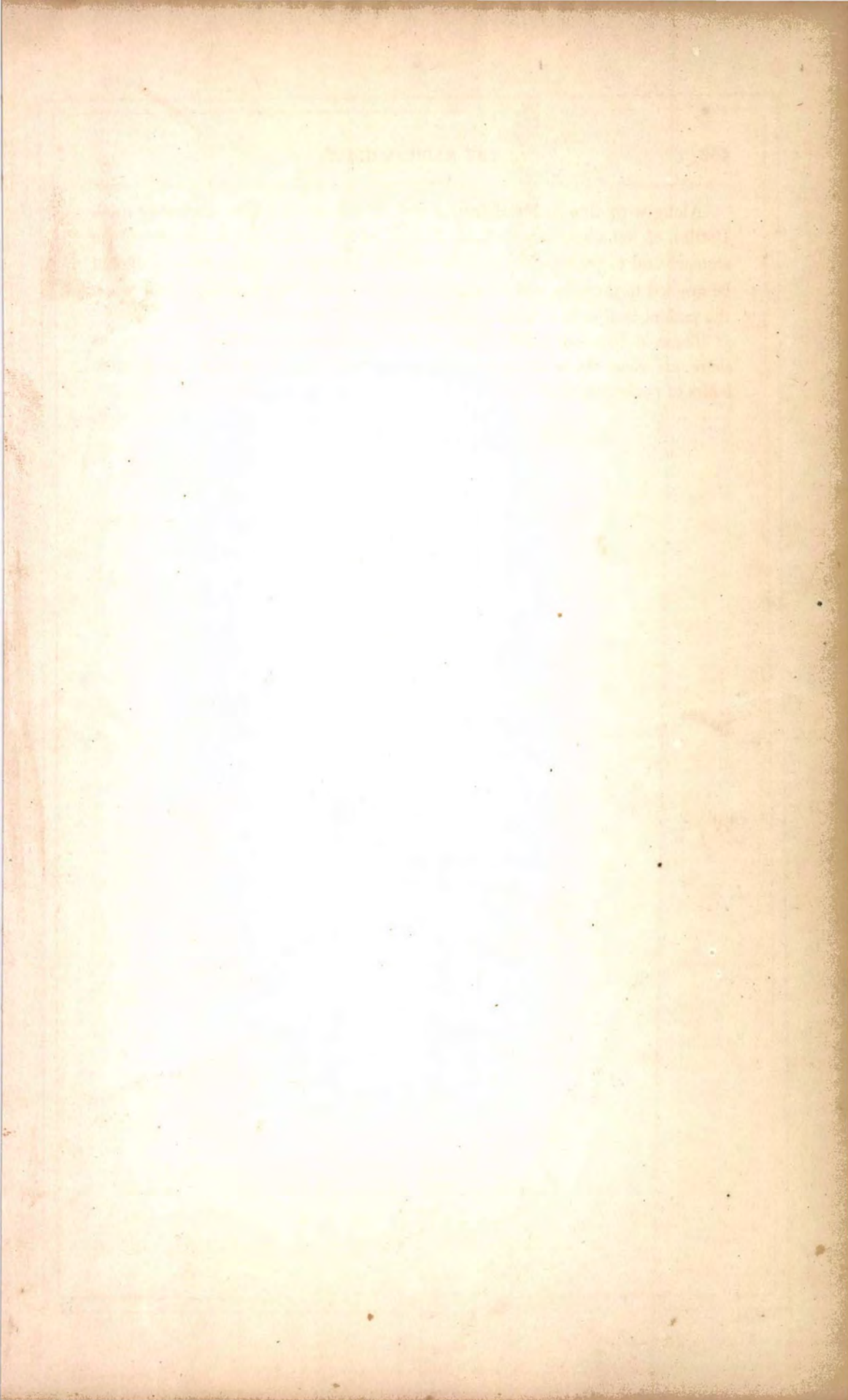
The administration of emetics and nauseants, such as tartar-emetic or tobacco probably from a similar motive, is highly improper. A recent writer upon the subject has quoted a case which occurred so lately as 1824, and where the patient was treated by a surgeon, and regarding which he remarks that, short of decapitation, no experiments could have been devised more calculated to prevent resuscitation. "When brought on board"—the man was a sailor, who fell into the sea from the yard-arm—"he showed no signs of life. I," *i.e.* the surgeon, "had him immediately suspended with his head downwards, and well shaken for a minute or two. He was then laid on the cabin table, and rubbed all over by two or three men with flannels, &c. Tartarized antimony was rubbed into the root of his tongue, and tobacco smoke blown into his mouth and nostrils."

The proper treatment of an individual taken out of the water in a state of insensibility is as follows:—The two great things to be aimed at are, to restore the circulation, and to excite the nervous system out of its torpid state. The body must be stripped as rapidly as possible of its wet clothes, rubbed dry, and surrounded by warm air, either by means of the hot-bath, or, that not being procurable, heated blankets. Artificial respiration should then be performed without delay, and persevered in for a long time.

The following are Dr. Carpenter's directions for performing this operation:—"Until more appropriate means are available, the natural movements may be, in some degree, imitated, by compressing the chest and abdomen, so as to diminish the cavity of the thorax, and to expel from the lungs as much as possible of their contents, and then allowing them to recover their former dimensions by their natural elasticity. Although but a poor substitute for the natural process, even this trifling assistance may be of the utmost benefit, if given at the critical time, when the heart's action is nearly suspended, and the vital powers rapidly sinking. When no bellows can be procured, the insufflation of the chest from the mouth of another, is the best measure that can be adopted. The insufflation is performed by applying the mouth of the operator to the mouth or to one of the nostrils of the patient, closing the other apertures, and making a forcible expiration, so as to dilate the chest, which is then to be emptied again by gentle pressure. . . . The insertion of a small tube into the nostril, of sufficient bore, will much facilitate the operation. . . . When a pair of bellows is employed, the air should be injected through one nostril, whilst the mouth and other nostril are closed; the latter is then to be opened for the expiration of the air, and the process repeated about fifteen times in a minute."

Along with this artificial inspiration, stimulants must be cautiously used. Bottles of hot water, wrapped in flannel, should be applied to the pit of the stomach and to the extremities. If signs of animation appear, friction should be applied to the skin, and stimulating vapours put to the nostrils. And when the patient is able to swallow, he should have hot brandy and water.

These measures should be persevered in for a considerable length of time, as there are cases on record in which recovery has taken place after one or more hours of perfect insensibility.



MUSCLES OF THE HUMAN BODY

Fig. 1

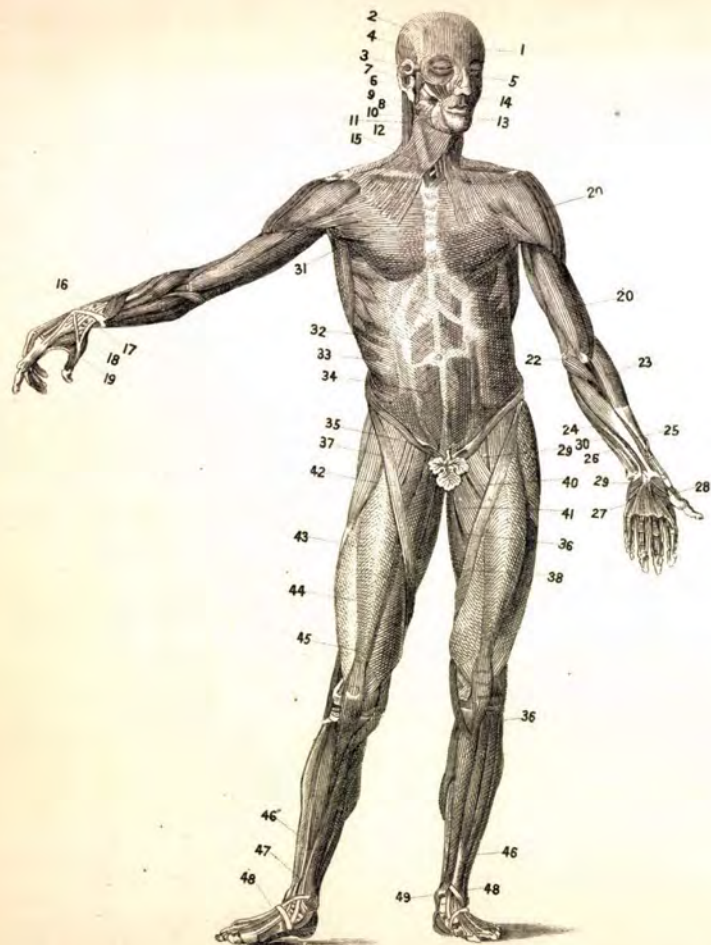
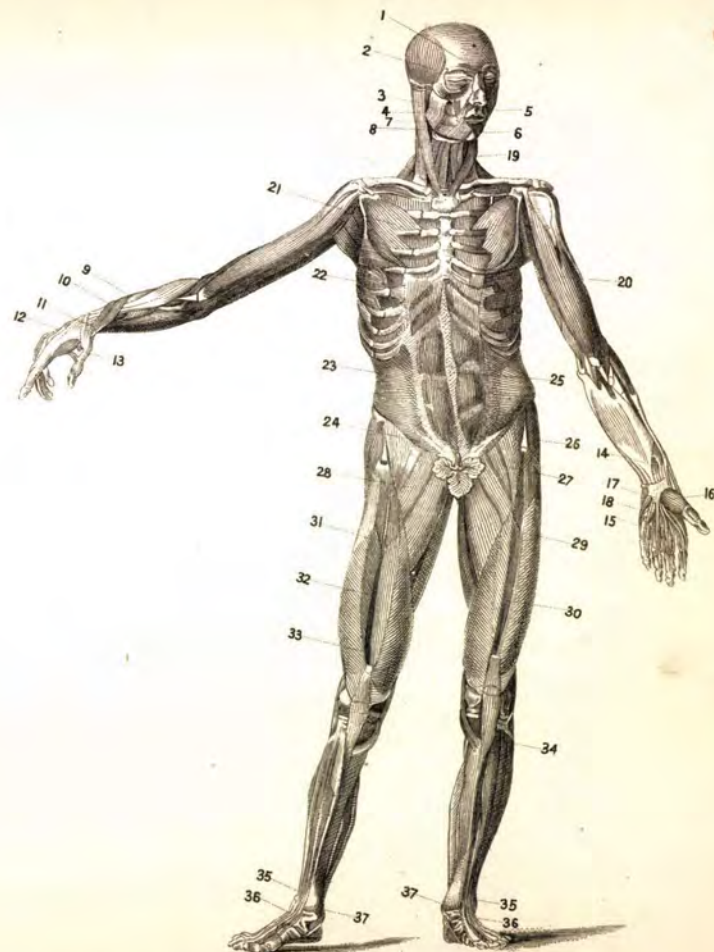


Fig 2



MUSCLES OF THE HUMAN BODY

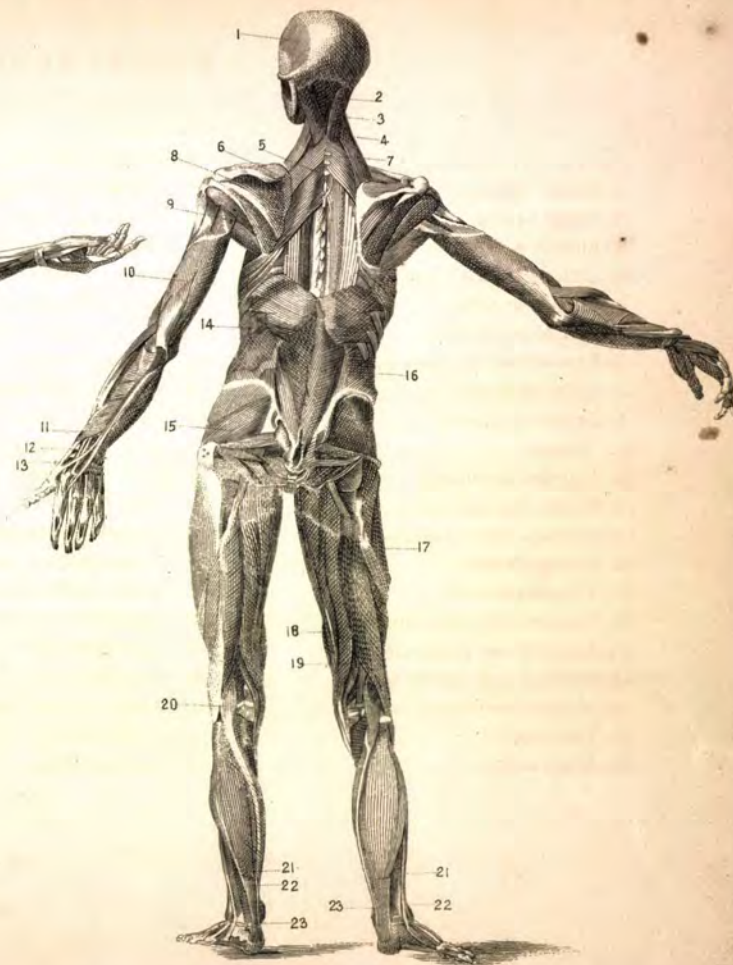
Fig 4



Fig 3



Fig 5



MUSCLES OF THE HUMAN BODY.—REFERENCE TO PLATE.

Fig. 1.

1. Occipito frontalis.
2. Atollens aurem.
3. Anterior auris.
4. Orbicularis palpebrarum.
5. Compressor naris.
6. Levator anguli oris.
7. Levator labii superioris alaeque nasi.
8. Zygomaticus major.
9. Zygomaticus minor.
10. Masseter.
11. Depressor anguli oris.
12. Sterno cleido mastoideus.
13. Depressor labii inferioris.
14. Orbicularis oris.
15. Platysma myoides.
16. Extensor digitorum communis.
17. Extensor carpi radialis longior.
18. Extensor carpi radialis brevior.
19. Abductor indicis manus.
20. Deltoides.
21. Biceps brachii.

22. Pronator radii teres.
23. Supinator radii longus.
24. Flexor carpi ulnaris.
25. Flexor carpi radialis.
26. Palmaris longus.
27. Aponeurosis palmaris.
28. Abductor pollicis manus.
29. Palmaris brevis.
30. Flexor sublimis perforatus.
31. Pectoralis major.
32. Obliquus descendens externus.
33. Linea semilunaris.
34. Linea alba.
35. Poupart's or Fallopius' ligament.
- 36, 36. Sartorius.
37. Tensor vaginae femoris.
38. Gracilis.
39. Iliacus internus.
40. Pectinalis.
41. Triceps adductor femoris.
42. Psoas magnus.
43. Vastus externus.

44. Vastus internus.
45. Rectus.
- 46, 46. Tibialis anticus.
47. Extensor longus digitorum pedis.
- 48, 48. Extensor proprius pollicis pedis.
49. Malleolus internus.

Fig. 2.

1. Corrugator.
2. Temporalis.
3. Masseter.
4. Buccinator.
5. Orbicularis oris.
6. Depressor labii inferioris.
7. Levator anguli oris.
8. Sterno cleido mastoides.
9. Extensor ossis metacarpi pollicis manus.
10. Extensor primi internodii.
11. Extensor secundi internodii.
12. Indicator.
13. Abductor indicis manus.
14. Flexor sublimis perforatus.
15. Lumbricalis.

16. Flexor ossis metacarpi pollicis.
17. Abductor minimi digiti manus.
18. Flexor parvus minimi digiti.
19. Sterno hyoideus.
20. Biceps brachii.
21. Pectoralis minor.
22. Serratus magnus.
23. Obliquus ascendens internus.
24. Pyramidalis.
25. Rectus abdominus.
26. Iliacus internus.
27. Psoas magnus.
28. Pectinalis.
29. Triceps adductor femoris.
30. Gracilis.
31. Vastus externus.
32. Cruralis.
33. Vastus internus.
34. Ligamentum patellae.
- 35, 35. Extensor proprius pollicis pedis.
- 36, 36. Extensor longus digitorum pedis.
- 37, 37. Malleolus internus.

MUSCLES OF THE HUMAN BODY.—REFERENCE TO PLATE.

Fig. 3.

1. Temporalis.
2. Occipito frontalis.
3. Platysma myoides.
4. Sterno cleido mastoideus.
5. Trachelo mastoideus.
6. Splenius.
7. Deltoides.
8. Biceps brachii.
9. Brachialis internus.
10. Supinator radii longus.
11. Triceps extensor cubiti.
12. Trapezius seu cucullaris.
13. Latissimus dorsi.
14. Serratus magnus.
15. Obliquus descendens externus.
16. Gluteus maximus.
17. Gluteus medius.
18. Sartoris.
19. Vastus internus.

20. Vastus externus.
21. Rectus.
22. Tendon of the biceps muscle, forming the outer ham-string.
23. Tendons of the semimembranosus and semitendinosus muscles, forming the inner ham-string.
24. Gastrocnemius externus.
- 25, 25. Peroneus brevis.
26. Extensor longus digitorum pedis.
27. Extensor brevis digitorum pedis.
28. Plantaris.
29. Gastrocnemius.
30. Tendo achillis.

Fig. 4.

1. Occipito frontalis.
2. Temporalis.
- 3, 3. Trapezius seu cucullaris.
4. Sterno cleido mastoideus.
5. Deltoides.

6. Extensor ossis metacarpi pollicis manus.
7. Extensor primi internodii.
8. Extensor secundi internodii.
9. Extensor digitorum communis.
10. Triceps extensor cubiti.
11. Extensor digitorum communis.
12. Latissimus dorsi.
13. Gluteus maximus.
14. Biceps flexor cruris.
15. Semitendinosus.
16. Semimembranosus.
17. Gastrocnemius.
- 18, 18. Peroneus brevis.
- 19, 19. Peroneus brevis.
- 20, 20. Tendo achillis.

Fig. 5.

1. Temporalis.
2. Complexus.
3. Splenius.

4. Levator scapulæ.
5. Rhomboideus minor.
6. Supra spinatus.
7. Serratus superior posticus.
8. Rhomboideus major.
9. Infra spinatus.
10. Triceps extensor cubiti.
11. Extensor primi internodii.
12. Extensor secundi internodii.
13. Indicator.
14. Serratus posticus inferior.
15. Gluteus medius.
16. Obliquus ascendens internus.
17. Biceps flexor cruris.
18. Semitendinosus.
19. Semimembranosus.
20. Plantaris.
- 21, 21. Gastrocnemius internus.
- 22, 22. Gastrocnemius externus, part cut off.
- 23, 23. Tendo achillis.

DICTIONARY OF MEDICAL SCIENCE.

MEMORANDUM.

ONE important object of this Dictionary is convenience of reference. In the body of the work, each subject is treated in the order of its natural sequence, and falls into the place which it must, of necessity, assume in a systematic treatise—a method which has its decided advantages, but which is, at the same time, attended with the inconvenience, that the reader, desirous of becoming acquainted with any particular subject, may have considerable difficulty in finding it. To obviate this is one aim of the following concise explanations, arranged in alphabetical order.

But the Dictionary will likewise be found useful in another respect. It is intended to be supplementary to the treatise itself. In the four preceding divisions, we have endeavoured to develop principles rather than explain isolated facts. But many of these facts are interesting, and it is one of the objects of the Dictionary to give an account of those which are omitted in the body of the work.

We must, at the same time, repeat our statement, that a knowledge of these medical facts, however important to the general reader as a branch of useful information, is neither intended nor expected to enable a non-professional person to rely exclusively on his own skill for treating disease with success, either in himself or others.

ABSCESS.

ABSCESS.—This expression is derived from the Latin word *abscedo*, which means, to separate, the effect of an abscess being to separate parts. An abscess essentially consists in a collection of pus, which has been secreted by the process of inflammation. Sometimes the purulent matter is effused into the substance of an organ or part, and confined to a certain limit by means of the fibrin, which has also been effused by the inflammation. In this case the fibrin often confines it like a waterproof bag. At other times, the pus is confined by means of the fasciæ of muscles, or in other natural cavities. In all cases, a portion of the confining membrane is sure to be gradually absorbed, and the pus poured out. An ulcer is then formed. The conversion of an abscess into an ulcer is often artificially produced by means of the surgeon's knife.

ABSORPTION.—We here refer to the chapter upon this subject in Part I. The following is an abstract of our knowledge regarding it. The

ABSORPTION.

term is derived from the word *absorbeo*, which means, to suck up. All the elements composing the body are continually, having become effete and actually poisonous, passing away from it. This separation or removal of these effete and injurious matters constitutes one form of absorption. The veins and absorbent vessels take up these dead particles and pour them into the blood, and the blood expels them by means of the excreting organs, of which the principal are the lungs, the liver, the kidneys, and the skin. The name of these absorbent vessels that take up effete matter is *lymphatics*.

The other kind of absorption is a different one. It is managed by the lacteals that arise from the digestive organs, and convey to the blood the products of the digested food, not to be expelled, but to replace in each different part of the body the substances taken away by the veins and lymphatics, for the purpose of being excreted.

ACACIA.—The name of a genus of plants belonging to the Leguminosa, or pea family. One species affords catechu, and another gum-arabic.

ACETATE.—An acetate is the name given to a salt produced by the combination of acetic acid with an alkaline, earthy, metallic, or vegetable alkaloid base. Acetates seldom occur in nature, but are usually artificial combinations.

ACETIC ACID.—This is the substance to which vinegar owes its sourness. In fact, vinegar is acetic acid mixed with water, colouring matter, and impurities. The simplest mode of forming it is by fermenting sugar. Sugar is a compound of carbon, oxygen, and hydrogen. When, under the proper conditions, ferment is added to a solution of it, so much of the carbon and oxygen pass away in the shape of carbonic acid, and what is left behind is alcohol and water. If this latter be exposed to the air, and kept at a certain temperature, farther changes take place in the proportions in which its elements combine; some of the oxygen and hydrogen unite in the proportions that form water, and the remainder of the elements unite together and form the compound in question—acetic acid.

Abroad, vinegar is often prepared from wine. In this country, either sugar or malt is employed. The strongest vinegar contains about five per cent. of real acetic acid; and, at the present time, the excise laws allow the presence of a small quantity of sulphuric acid, or oil of vitriol, which does no harm, and increases the acid qualities of the vinegar.

Acetic acid is also prepared from wood, by exposing it to destructive distillation. For this purpose, oak, ash, birch, or beech-wood is preferred. The wood of fir will not answer at all, from containing so much oil of turpentine. The wood is distilled in cast-iron cylinders. Acetic acid, and various other substances, come over, and are condensed by the worm of the still being kept in cold water. The distilled liquor separates into layers; the one containing the acetic acid is removed by a pump or syphon, and then saturated with lime. In this manner an impure acetate of lime is obtained. To this, sulphate of soda is added, the sulphuric acid of which combines with the lime, forming sulphate of lime, and the acetic acid and soda unite to form acetate of soda. To this last mentioned, sulphuric acid is added, and the mixture distilled. The acetic acid comes over, leaving sulphate of soda behind.

The following is the composition of pure acetic acid—

Carbon,	47
Oxygen,	5
Hydrogen,	47
	—
	99

Acetic acid possesses a most remarkable antiseptic

power over dead animal and vegetable matter. It is on this account extensively used in forming vegetable pickles, and of late it has become common to smear over pork with the acid obtained from distillation of wood, which is sold in the shops under the name of pyroligneous acid. The result of this is, that the pork becomes converted into ham or bacon almost instantaneously.

Concentrated acetic acid acts upon man as a corrosive poison. Diluted, it is used as a refrigerant, tonic, &c. It is also employed to sponge the skin with in febrile affections.

Aromatic vinegar, or thieves' vinegar, as it used to be called, is prepared by infusing rosemary leaves, sage do., cloves, lavender flowers, and sometimes camphor, in acetic acid.

ACIDS.—These form a very numerous and important class of chemical substances. They are generally sour to the taste; they redden vegetable blues, and unite readily with earths, alkalies, and metallic bases. As no elementary substance possesses these qualities, acids are necessarily compound bodies. Some of them, as the carbonic, are gaseous; others, as the nitric, fluid; and some, of which boracic acid is an example, solid.

For a long time it was thought that oxygen was indispensably necessary to the existence of an acid. This is now known to be incorrect, but the oxyacids are still very important. As oxygen often combines with the same substance in more than one proportion, forming thus two or more different acids, it was found necessary to adopt some certain laws of nomenclature. A very convenient plan was fallen upon, which it may be useful here to describe.

If oxygen combines with a substance in two proportions, the name of the acid which contains the most oxygen ends in *ic*, and that of the one which contains least in *ous*. Thus, sulphuric acid contains more oxygen than the sulphurous. Sometimes, however, as is the case indeed with sulphur, more than two unions with oxygen take place, and more than two acids are formed. When this happens, if an acid is discovered, that containing less oxygen than the *ous*, or sulphurous acid, is called the *hyposulphurous* acid, and the one containing more oxygen than the sulphurous, but less than the sulphuric, is called the *hyposulphuric*. If, however, which may be the case, an acid were discovered that contained more oxygen than the sulphuric, it would be named the *hypersulphuric*, or, by some chemists, the *persulphuric*.

ACONITE, or wolfsbane, a poisonous plant, used externally to relieve the pain of tic-doloureux.

ACORUS is the botanical name of the indigenous marshy plant that produces the slightly tonic and aromatic roots, known as sweet flags.

ACOUSTICS.—The science of sound. See the chapter on 'Voice,' and the treatise upon 'Hearing.'

ACTUAL CAUTERY.—In order to produce a discharge which might act as a counter-irritant, it used to be a plan, and sometimes even yet is, to apply a small piece of iron heated to a white heat. The adjoining parts being well protected by damp paper, &c., and the intense heat of the iron at once destroying the sensibility of the part to which it is applied, make the actual cautery not so horrible a proceeding as it seems at first sight—still it must be bad enough.

ACU-PUNCTURE.—This is an extraordinary Eastern remedy, and consists in sticking needles into parts affected with rheumatic or neuralgic pains. The needles are introduced with a peculiar rotatory motion, and when properly put in do not give any pain. The greater part of the good that is sometimes seen to follow the employment of these needles, is probably to be ascribed to the effect produced upon the imagination.

ACUTE.—An acute disease is one that rapidly ends either in recovery or death.

ADIPOCERE.—This word is derived from *adeps*, fat, and *cera*, wax, because it resembles both these substances. It is, in fact, an ammoniacal soap, formed, under certain circumstances, by the combination of the fat of the dead human body with the ammonia that has been produced by the decomposition of other parts of the structure. It also generally contains a little potash and lime.

The existence of this substance was discovered in 1786, in an immense burying-place in Paris, and is undoubtedly common in similar places. Its formation appears to be promoted by the presence of water.

ADIPOSE TISSUE.—This is cellular tissue filled with fat. We may here state that the fat of man and of the higher animals is, in the living state, fluid, or nearly so. For a general account of the deposition and uses of fat, we must refer to the body of the work, under the heads of Fat, Animal Heat, Diet, &c. We may here add, that it is sometimes deposited in a very abundant quantity. The weight of a healthy adult man of ordinary size, may be, perhaps, put down at twelve stones; yet so great is the tendency to deposit fat in some individuals, that they have attained a weight of thirty-two, and even more than forty stones. When it accumulates, however, to such an extent, it constitutes the disease of obesity.

ETHER.—This is a Greek word, and indicates a very penetrating, volatile, and inflammable fluid. The term is now restricted to various compounds having these properties, formed by the action of acids upon alcohol. As instances of ethers, inasmuch as both are extensively used in medical prescriptions, we may notice the sulphuric and the nitric.

Sulphuric æther is prepared by mixing together, in a retort, sulphuric acid and alcohol along with

some carbonate of potash, and then by applying heat and distilling. The object of adding the potash is to rectify it from impurities that are formed during the process. Very complicated changes take place; but, in point of fact, in order to convert two equivalents of alcohol into one of æther, all that is necessary to be done is to abstract one equivalent of water; and this is done during the process. Thus,

	Carbon.	Hydrogen.	Oxygen
2 equivalents of alcohol are composed of.....	4 eq.	6 eq.	2 eq.
Subtract 1 equivalent of water, composed of.....	—	1 eq.	1 eq.

There remains 1 equivalent of æther, composed of.... 4 eq. 5 eq. 1 eq.

Sulphuric æther is a powerful stimulant and antispasmodic, and is much used in colic, asthma, cramp of the stomach, and other analogous diseases. It is also used, mixed with water, as an external application, to produce, by means of its rapid evaporation, cold. The dose of the sulphuric æther of the shops is about a teaspoonful diluted in water.

Nitric æther, or rather spirit of nitric æther, or sweet spirits of nitre, is prepared by mixing together nitric acid and alcohol. It is a limpid fluid, with a peculiar æthereal odour and taste, and extremely volatile. It is stimulant, antispasmodic, and also diuretic. Its dose is from one to two or three teaspoonfuls in water.

Spirit of nitric æther contains nineteen per cent. of nitrogen.

AFFINITY, CHEMICAL.—Chemical affinity is exercised between the minutest particles of bodies, and it is indispensable for its action that these bodies be in contact with one another. Very familiar examples of it may be alluded to. Thus sugar and water, upon being mixed, immediately combine. Sugar and spirit, however, combine very sparingly together. Water and spirit combine readily enough, while water and oil will not combine at all. From these, and thousands of analogous instances, it appears that chemical affinity exists between different bodies in different degrees, being very strong in some, and feeble or absent in others.

When substances having a chemical affinity for one another are mixed together, a new substance is formed. Sometimes, indeed, something more than this is done, and the formation of a new compound often destroys a previously existing one. Thus, when an alkali, as ammonia, or hartshorn, as it is commonly called, is mixed with oil, the compound well known by the name of soap (although in this instance in a fluid state) is formed. If to this soap a little sulphuric acid (oil of vitriol) be added, the ammonia instantly quits the oil to unite with the acid, and the oil is obtained as it was before the ammonia was added to it. This is an

example of what has been called *elective* affinity, because in it a substance exhibits a choice, as it were, for one of two others, uniting with it and excluding the other. The degree of affinity which the various elementary substances have for one another has been very exactly determined by chemists. Very frequently *two* compounds mutually decompose each other, and *two* new compounds are formed by an exchange of their elements. This last has been called *double elective* affinity.

Then, with regard to the proportions in which bodies unite with each other, very important discoveries have been made. Unfortunately, to a beginner they are somewhat difficult, but they are of too much consequence to be passed over. Some substances, as spirit and water, for example, can unite in any proportion; others, like salt and water, in any proportion, until a certain quantity of one ingredient has been added, after which no farther combination can take place; but by far the greater number of substances can combine only in one or a few fixed proportions. There is also (and this is a very important fact) a relation between the proportions in which all bodies combine with one another; and the numbers expressing the proportions in which any two substances combine with a given weight of a third substance, likewise express the proportions in which they will combine with each other. The expressions, 'atomic weight,' or 'equivalent,' are in use to indicate these proportions defined to a standard of comparison. Thus, the equivalent of oxygen is 8, of sulphur, 16, and of hydrogen, 1. When water is formed by the union of its elements, 1 hydrogen unites with 8 oxygen, and thus the equivalent of water is 9. So, in like manner, 8 oxygen unites with 14 nitrogen (14 is the equivalent of nitrogen), and forms nitrous oxide, or laughing gas, as it is called, and the equivalent of this is 22 ($8 + 14$).

The only other fact relative to the proportions in which bodies unite, necessary now to mention, is this:—When a substance combines with another, as is often the case, in more than one definite proportion, the quantity of one of them in the different combinations will be exactly double, or triple, or some multiple of the smallest proportions in which it enters into combination with the other substance. Thus, 14 nitrogen can combine with 8, or 16, or 24, or 32, or 40 oxygen, but cannot combine with any intermediate proportion.

AFFINITY, VITAL.—The elements that form living structures, although the same as, and indeed derived from, the dead world, do not obey the above-mentioned laws of chemical affinity. They are, however, arranged in obedience to certain other laws, called those of *vital* affinity. When life ceases in any living being, the elements composing it return under subjection to the laws of chemistry. In animals, besides the final death, a portion of their

frame also dies daily.—See the first division of the body of the work *passim*.

AFFUSION, COLD.—This is the technical name for the sudden application of cold water to any part of the body. This mode of applying water as a remedial agent has of late been prominently brought forward by the hydropathists, but is, nevertheless, as old as the time of Hippocrates, and probably of still more ancient date. The effects produced by it are similar, but in less degree, to those of the cold bath.—See 'Bath.'

AGUE.—See 'Intermittent Fever.'

AIR.—The atmosphere is composed essentially of oxygen and nitrogen, but it also invariably contains moisture, carbonic acid, and ammonia. It often likewise has mixed up with it various odorous vapours, and the matters of miasmata and contagion.—See 'Climate,' 'Respiration,' and 'Ventilation.'

ALBUMEN, ANIMAL.—This is an animal proximate principle, of which the white of egg is a very good example. It is characterized by coagulating when heated up to 180° of Fahrenheit, or when a strong acid is added to it. Its composition, leaving out the phosphorus, sulphur, &c., which occur in very small quantities, is—

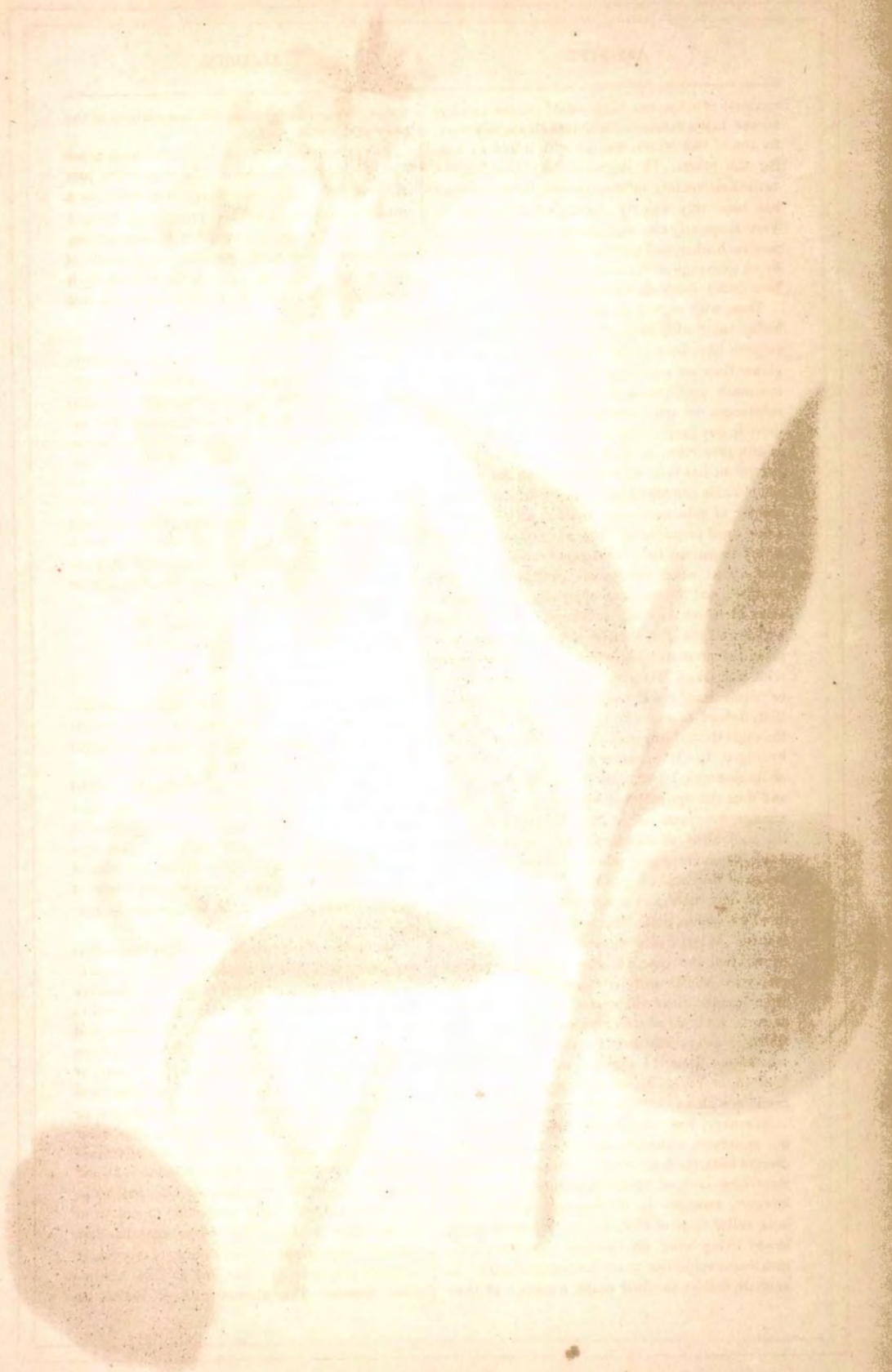
Carbon,.....	53
Oxygen,.....	23
Nitrogen,.....	15
Hydrogen,.....	7

ALBUMEN, VEGETABLE.—A vegetable proximate principle, found in the sap of plants, in the husks of seeds, in the stems, &c., exactly analogous to the above.

ALBUMINOUS PROXIMATE PRINCIPLES.—The name given to that important group of principles found in animals and plants, in the blood and sap, that essentially consist of carbon, oxygen, hydrogen, and somewhere about fifteen per cent. of nitrogen, with small and varying proportions of sulphur, phosphorus, chlorine, iron, magnesia, potash, &c. &c.

ALCOHOL.—A proximate principle of the saccharine group, produced by the fermentation of sugar.

In order that sugar may ferment, it is necessary that it be dissolved in water, that it be exposed to the air, that a certain temperature be present, and that a ferment be added to it. A ferment appears to be almost any substance in a state of decay, or eremacausis, as it is called. A piece of rotting and putrid meat, the gluten of the husks of grapes, or yeast, are able to set the change agoing. The sugar parts with one equivalent of carbon, and another of oxygen. These unite together as carbonic acid, and pass off. Sometimes this carbonic acid gathers in breweries and distilleries to such an extent as to produce fatal results. Now, when sugar has lost one equivalent of carbon, and another of oxygen, it loses the properties of sugar, and, in fact, has become alcohol. This alcohol will, of course, be



MEDICINAL PLANTS.



AMYGDALUS COMMUNIS.
THE ALMOND TREE.

mixed up with the water in which the sugar was dissolved. From this, however, it is separated by the process of distillation.

In distillation, oil and other impurities pass over with the alcohol. These are removed by the process of rectification, &c.

Alcohol is a limpid, colourless, inflammable fluid, and no degree of cold has ever yet been able to freeze it. That sold in the shops as silent spirit, or flavoured in the shape of rum, gin, &c., always contains a large quantity of water.

Alcohol is the type of that class of remedies to which the name of stimulant is given.—For its action, taken habitually, see 'Wine,' 'Beer,' &c.

ALE.—A liquid produced by fermenting the sugar of malt, and adding to the mixture of alcohol and water, thus formed, infusion of hops.

ALKALI.—An alkali is a compound substance, characterized by forming neutral salts with acids, by turning vegetable blues green, and restoring the blue colour to a vegetable blue that has been redened by an acid. We may instance as alkalies, ammonia, potash, soda, and morphia.

ALLOY.—A mixture of two or more metals.

ALMONDS.—The almonds of the shops are the kernels of the almond-tree. Two kinds are known, one bitter and the other sweet. The latter is used as a dessert fruit, and both are employed in medicine.

ALOES.—For an account of this drug, see Chapter V., Part II., on 'The Principal Remedies.'

ALTERATIVES.—This is the name given to a class of medicines whose action is confessedly obscure, and, doubtless, often exaggerated.—See Chapter IV., Part II., on the 'Action of Remedies.'

ALUM.—This is the popular name for the sulphate of alumina and potash, and is a compound of clay, potash, and sulphuric acid. It possesses astringent properties.

AMAUROSIS.—See 'Gutta Serena.'

AMBER.—This is a mineral substance found in Greenland, Germany, &c. It has, probably, a vegetable origin, and is a resin of some primeval trees, dissolved in a volatile oil. It is the oil that is used, although rarely, in medicine. When rubbed, amber becomes electrical, and it was the first substance that was observed to become so affected. Its Greek name is *ηλεκτρον*, and from this name of it the science of *electricity* derives its appellation.

AMBERGRIS.—This is a substance of an animal origin, found in warm climates floating upon the sea, and supposed to be an intestinal concretion of some of the cetacea. It is a solid, opaque, grey substance, with an agreeable odour, and, owing to this latter quality, it is used as a perfume.

AMMONIA is the modern name of the compound formerly called the Volatile Alkali. It does not occur in the mineral world, but is produced by the decomposition of animals and plants. It is com-

posed of nitrogen and hydrogen, in the proportion of three of the latter to one of the former. When pure, it is a transparent and colourless gas, of an extremely pungent and irritant odour, and very poisonous. It is readily dissolved by water, and the solution is named spirit of ammonia, or, popularly, hartshorn. It receives this last-mentioned name, because the animal substance formerly fixed upon to be allowed to putrefy to furnish it, was the horn of the hart or deer.

The watery solution of it possesses the pungent properties of the gas, although in a less degree. Whether smelled at or (still farther diluted) drank, it is stimulating and antispasmodic, and, as such, is much employed.

AMMONIA, CARBONATE OF.—This is the Sal Volatile of our ancestors, and possesses the medical properties of the above. A very convenient preparation is kept in the shops, called Spirit of Sal Volatile. It is composed of carbonate of ammonia, spirit, cinnamon, cloves, and lemon-peel.

AMMONIACUM.—This is a gum resin of a very disagreeable smell and nauseous taste, used as an antispasmodic in cases of hysteria, asthma, &c.

ANALYSIS.—The literal meaning of this word is, the act of unloosing or untying; and it is opposed to synthesis, or the act of putting together. In chemistry, analysis consists in separating compound bodies into their simpler or elementary constituents. When the number and nature of these elementary constituents alone are determined, it is termed the *quantitative* analysis; but when, in addition, the proportions also are ascertained, it is called the *qualitative* analysis. The recent advances of chemistry have rendered both quantitative and qualitative analysis extremely minute and accurate.

ANASARCA.—Anasarca is that variety of dropsy, in which the watery fluid accumulates between the skin and the flesh.—See 'Dropsy.'

ANATOMY literally means the separation of anything by cutting; but it now signifies dissection of recently living structures, and the knowledge that is acquired by such dissection. When the structure dissected is that of a human being, we call it human anatomy, and when that of the lower animals, comparative anatomy. We also have vegetable anatomy.

The practice of anatomy is indispensable to both the medical and the surgical student, and the feeling that was entertained against it has, since the last legislation upon the subject, been fast dying away.

ANCHOVES are a genus of fishes, of which the common anchovy is the most familiar example. This animal is found in abundance in the Mediterranean, and the most productive fishing of it is carried on off Gorgona, near Leghorn. In this place the anchovies come in great numbers during

the months of May, June, and July, for the purpose of depositing their roe. Like many other fish, they are either attracted or rendered stupid by artificial light, which is therefore employed by the Italian fishermen to entrap them. After they are caught, they are salted. Sometimes they are eaten whole; but their principal use now, and for the last two thousand years (for anchovy sauce, or *garum*, was much relished by the Romans), is to form the well-known condiment called anchovy sauce. In order to form this, the fish are bruised, and boiled over a slow fire with melted butter. This dissolves the whole into a fluid mass.

ANGUSTURA BARK is a tonic. There is, or was, a spurious Angustura bark, sometimes confounded with the right kind, and this false bark is a pretty active poison. As the true Angustura may be spared from our list of drugs, the best preventive from making a mistake would be, never to use any Angustura bark at all.

ANIMAL, is the term applied to a living organized structure, that, in addition to the vitality possessed by a vegetable, has consciousness of external impressions, and, in general, the power of locomotion.

ANODYNES.—This term is derived from a Greek word which signifies "that which relieves from pain." An anodyne, however, properly speaking, is a medicine that has the power of diminishing the sensibility of the nervous system, and therefore of dulling the sensation of pain. Generally speaking, anodynes also tend to induce sleep, and are often, in consequence, called hypnotics and narcotics.

ANTACIDS are chemical remedies, which, by combining with free acids in the stomach, form neutral salts. The most familiar example of an antacid is carbonate of soda.

ANTIDOTES.—This term is composed of two Greek words, and signifies "given against." It means, in modern language, a substance which has the power of chemically uniting with a poison introduced into the stomach, and of, by this union, forming an inert compound. And it is fortunate that, for a few of the most virulent poisons, we do possess antidotes. But the term had formerly a wider meaning, although based upon a very erroneous supposition. It was believed that certain diseases were set up in the system by different causes, against whose evil effects we possessed antidotes. This is, unfortunately, quite a mistaken notion.—See Chapter on 'Action of Remedies.'

ANTIMONY is a metal that was discovered in the fifteenth century. Some of its salts were tried upon some monks, who were killed by it, and hence its name, which means, "bad for monks."—For the composition and uses of its compounds, see Chapter V., Part II.

ANTIPHLOGISTIC REGIMEN AND TREATMENT.—Antiphlogistic is composed of two Greek words

that imply, "against inflammation." Antiphlogistic regimen consists in abstaining from food, stimulating drinks, and other stimulants, and in remaining in bed. The antiphlogistic treatment consists in bloodletting, and administering nauseates, diaphoretics, &c.

The antiphlogistic treatment is exclusively the business of the medical man. The antiphlogistic regimen, or management of a sick person in acute diseases, comes within the province of the nurse or attendant upon the sick-bed. The air of the apartment in which the sick man is confined, should be kept at a uniform temperature of about 60°. Due care should be taken that it be renewed at frequent intervals. No strong glare, either of sunlight or artificial light, should be allowed; the room should be partially darkened, and the fire and candles screened. All violent and disturbing noises should be prevented; if near a highway, the road should be covered with tanners' bark or straw, and all unnecessary conversation in the sick chamber strictly prohibited; and, in particular, all conversation tending to irritate or annoy the mind of the patient, now more than ever susceptible of such influences, must be avoided. If, as is too often the case, the sick person persists in demanding some article of diet which is prohibited to him, and indeed very improper for him, it is better to yield than to annoy him by contradiction; and, in the majority of cases, it will be found that the quantity of the forbidden food that he will consume before he is tired of it is so small, that it will have no injurious effects upon him. Most people suffering from acute disease are tormented with an intolerable thirst, to relieve which, toast and water, barley water, and the like, for a day or two, are sufficient. But of these the patient soon tires, and demands cold water. This should never be denied to him.

Another point to be attended to in the domestic management of individuals suffering from acute disorders, is the reasonably frequent change of the linen and the night-dresses.

ANTISCORBUTICS.—This is a name given to a class of remedies, or rather to a class of articles of diet, that prevent, and perhaps also cure, the sea-scurvy. (For the symptoms, &c., of this disease, see 'Scurvy.') All fresh vegetables that are edible belong to this class of remedies. On land, there is no difficulty in obtaining a sufficient supply of these; but at sea, preserved lemon-juice is found to be the most convenient, and, at the same time, quite efficacious. It is, and now has been for many years, regularly served out in our royal navy, and has quite destroyed a disease that used to ravage our seamen like a pestilence.

ANTISEPTICS.—This word is derived from the Greek words, *anti*, against, and *σептсμσ*, which means, to corrupt. Antiseptics are all those substances that have the power of preventing animal

and vegetable structures, to which they are applied, from becoming rotten, or undergoing the putrefactive fermentation. (See also 'Putrefaction.') All objects of the living creation, whether animals or plants, after a time, lose their vital peculiarities, and become subject to the laws of dead matter, or, in other words, to those of chemistry. The combinations that existed during life are changed, and the elements that composed the proximate principles of animals and plants, now arrange themselves so as to form other combinations, of which, perhaps, the most important are, ammonia, carbonic acid, and sulphuretted hydrogen.

Now, although the proximate principles of animals and plants can, if taken into the stomach and there digested, yield the different elements that compose them, to supply the blood with those analogous elements which it is constantly parting with to the body, nevertheless, ammonia, carbonic acid, &c., cannot, if taken into the stomach, be so assimilated and joined with the blood; consequently, the preservation of animal and vegetable articles of food that are dead from this process of putrefactive fermentation becomes an important one. There are various methods of managing this. One of them consists in the fact, that the application of certain other substances to the articles of food is sufficient for the purpose. Such are antiseptics.

The most important of these are, salt, saltpetre, sugar, and various aromatics. It is not very easy to explain the action of the sugar and aromatics, although their possession of an antiseptic power is unquestionable; but it is believed that part, at least, of the action of salt and saltpetre is to be explained by the strong affinity which these substances have for water. The presence of water is absolutely indispensable for this putrefactive fermentation; and the combination of the water, which the articles of food contain, with the saline substances, probably prevents the fermentation from beginning.

In various diseases, particularly in typhus, and in malignant scarlet fever, this tendency of various parts of the body to become putrid before they are separated from the body, is often to be observed. But we do not possess any "specific" remedy that can obviate this, and, in such cases, we have only to trust to general treatment.

ANTISPASMODICS.—Antispasmodic medicines, or remedies, are those that relieve spasms. Spasm, or cramp, as it is commonly called, is witnessed only in muscular structures. (See 'Spasm.') As these spasms come on from various causes, any remedy that can aid in removing the cause is an antispasmodic. Thus, the spasms, or cramps, that often come on in the calves of the legs, are usually caused by acid matter in the stomach; hence, a dose of magnesia, or carbonate of soda, (see 'Antacids,') will often prevent these cramps; and in this sense,

magnesia, or carbonate of soda, is antispasmodic. But the term is, in general, restricted to those remedies that have the power, not of removing the cause, but of removing the spasm itself when it has come on.

Perhaps warmth, applied either by hot clothes, or a hot bath, is one of the most effectual of the antispasmodics, particularly in cases of spasm of the bowels, or colic. Opium, aether, and alcohol, are the three most powerful drugs that we have that are antispasmodic. In the spasm of the air tubes, commonly known as asthma, smoking tobacco often produces, from its antispasmodic properties, a relief of the distressing symptom.

AORTA.—This is a Greek word, and has long been applied to the great vessel from which the arteries that convey red blood to the body derive their origin. (See Chap. III.) It arises from the left ventricle of the heart, and after giving off branches that supply the head and upper parts of the body, ultimately separates into two great branches that are destined to supply the two lower extremities. The structure of the aorta is the same as that of the arteries. It is liable to ossification, aneurism, and other diseases.

APERIENT.—See 'Purgative.'

APEX.—The top or point of anything. It is an anatomical phrase.

APTHE.—See 'Thrush.'

APOPLEXY.—Apoplexy is derived from a Greek word that means a sudden blow, and is a very apt name for the disease. Apoplexy is the name given to any set of symptoms that come on suddenly, and threaten to end in coma. (See Chap. I., Part II.) The most common cause of the disease is either rupture, or unusual distension of some of the blood-vessels of the brain.

Some individuals are much more predisposed to apoplexy than others. Males, for example, are far more liable to the disease than females; individuals after forty years of age, more than younger ones; and those with large heads, short necks, full chests, and of a full plethoric habit of body, more than those of the reverse physical conformations. Farther, people who live well, work little, and lead a sedentary life, are more liable to suffer from apoplexy than the temperate and the active. On the other hand, too great mental labour unquestionably predisposes to the disease.

The more common exciting causes that induce the apoplexy in those predisposed to it, are intemperance in eating or drinking, violent mental emotions, and any physical cause that impedes the return of the venous blood from the head, such as too tight a neckcloth, stooping the head, straining at pulling on tight boots, and the like.

All those who are predisposed to apoplexy, should, by temperate living, due but not excessive mental labour, and regular exercise, strive to keep

this tendency under. They ought also to avoid any cause that can, even for a moment, obstruct the return of the blood from the head to the heart.

Few people suffer from an attack of apoplexy, without having premonitory symptoms, which, if attended to in time, may often avert the disease. One of the most important of these is excessive drowsiness, connected with which there is usually the sensation of too great fulness about the head. This premonitory drowsiness varies in amount, from a difficulty of fixing the attention to absolutely falling asleep in the midst of ordinary occupations.

Another very common premonitory symptom is giddiness, and this is often combined with a feeling of approaching fainting.

A third set of premonitory symptoms consist in frequent yawnings, a difficulty of hearing, an obscurity of vision, singing in the ears, frequent fits of hiccups, and the like. Both these and the last-mentioned may, however, be merely indications of indigestion.

Along with these there is usually a good deal of pain in the head. This, however, is a symptom common to apoplexy and many other diseases.

Sometimes, but not necessarily, there is another premonitory symptom, and that is paralysis. This may be indicated either by difficulty of utterance, from the muscles of the organs of speech having been affected, or by an inability to write with previous facility, or by trailing the leg in walking. Or, which are, perhaps, commoner premonitory symptoms, by the eye losing the line in reading, by a little difficulty in swallowing, some numbness in the fingers, an occasional involuntary drooping of the eyelid, or an unusual tendency to stammer.

Certain mental premonitory symptoms often, also, show themselves. A tendency to become irritable about trifles, an inability to fix the attention, a provoking kind of forgetfulness, that is not felt as perfect forgetfulness, but in which the affected person is persuaded that he will recall the forgotten matter to his mind in a moment, but is much annoyed at not being able to do so, are, perhaps, the most common of these.

Apoplexy occurs in four different forms.

The first may be called perfect or sudden apoplexy. A person affected by this form, all at once falls down totally unconscious. The animal functions are not performed at all, and the organic ones very imperfectly. The affected person breathes slowly and imperfectly, and with each breath he snores; the skin is bedewed with a cold sweat, and the face is usually red or livid. The pulse is slow, but hard and strong. These bad symptoms either gradually disappear, and the affected individual gets better, or they get worse, and death ends the scene. In fatal cases, death does not commonly take place

until some hours after the first seizure; and life is seldom protracted beyond two days.

The second form is characterised by the commencement of it not being so violent and sudden, but gradually increasing in intensity. The loss of sensation, and of the power of motion, is not complete; instead of stupor and coma, there is generally violent headache, with sickness and vomiting. The pulse is weak and feeble, the headache becomes almost intolerable, and every now and then there is a fit of vomiting. The skin at this stage is cold. In the course of two or three hours the pulse acquires strength, the surface becomes flushed, the face gorged, and the stupor goes on increasing and increasing. For a while, the affected man can answer questions; but he soon becomes perfectly unconscious, and generally dies in the course of a couple of days. This form of apoplexy usually depends upon softening or some other diseased structural condition of the brain, and is almost always fatal.

The third form commences with an apoplectic seizure resembling the first, but the stupor is recovered from; yet some part of the body is found to be paralyzed. (See 'Paralysis.') In most cases of this kind, there are successive apoplectic fits, one of which at last proves fatal.

The fourth form begins with paralysis, and the apoplexy comes on afterwards.

It is evident, from the above remarks, that the treatment of apoplexy will vary very much in different cases. In the first form it will be decidedly and strenuously antiphlogistic, while it may be, at the commencement of a case of the second, stimulant.

All that a non-professional person can venture to do in a case of apoplexy is, if he is satisfied it is one of those belonging to the first form, to unloosen the neckcloth, place the person in such a position that his head is uppermost, dash a little cold water upon the face, and place the feet in hot water.

APOTHECARY.—The proper business of an apothecary is to dispense drugs; but, since the year 1815, the apothecaries in England have been the general practitioners of the country. They are now obliged to go through a long course of study, and to pass an examination. No one, except a member of the Apothecaries' Company, can legally, in England, treat disease, and also supply his patients with the necessary remedies.

APOTHECARIES' WEIGHT.—The following table exhibits the divisions of the pound used in dispensing solid drugs, with the symbols that indicate each weight in a prescription:—

20 grains (grs.)	make 1 scruple (ʒi.)
3 scruples (ʒij.)	make 1 drachm (ʒi.)
8 drachms (ʒviij.)	make 1 ounce (ʒj.)
12 ounces (ʒxij.)	make 1 pound (lbj.)

The pound is the pound Troy.

Fluid medicines are dispensed according to the following scale:—

60 minims (m. lx.) make 1 fluid drachm (f. 3j.)
8 drachms (3 viij.) make 1 fluid ounce (f. 3j.)
20 ounces (3 xx.) make 1 pint (Oj.)

APPETITE (LOSS OF) is a symptom of many acute diseases, and of dyspepsia or indigestion.—See 'Dyspepsia.'

APPLES.—These are the most important natural fruit of cold climates.—See Chap. I., Part III.

APRICOTS.—See Chap. I., Part III.

AQUA-FORTIS.—This literally means strong water, and is the old-fashioned name for nitric acid.—See 'Nitric Acid.'

ARBUTUS UVA URSL.—This is the bear-berry of our ordinary language. An infusion of its leaves is used in chronic diseases of the bladder.

ARGINA PECTORIS.—This is a very distressing and dangerous disease, sometimes of a purely nervous or spasmodic nature, and sometimes connected with disease of the organs of circulation. In its fully formed state, it occurs in paroxysms. A very severe pain is felt in the chest, generally in the left side; the sensation of immediately impending death is experienced; sometimes the pulse is quickened, but more generally it is weak and irregular, the countenance is pale, the expression anxious, and the feeling of suffocation most unpleasant. The fit lasts from two minutes to half an hour. It is not a common disease, is much more frequent among males than females, seldom occurs in persons younger than fifty, and is very often excited by strong mental emotion, as anger, or long-continued anxiety.

Except in very severe cases (and such can only be managed by a medical man), the treatment consists in prevailing upon the person attacked to lie down until he gets better again.

ARM-PIIT.—This is the deep cavity of the shoulder-joint, and is technically called the *axilla*. In it are placed a collection of lymphatic glands, which are liable to become tainted with cancerous matter, in cases of cancer of the breast.

AROMATICS.—These important medicinal agents are derived from the vegetable kingdom. They are much used both in the treatment of disease, and as dietetical agents for the preservation of health. It would seem that they are more necessary, in this latter respect, in hot countries than in cold ones; and accordingly, all hot countries naturally abound with aromatic plants. They appear to be absolutely necessary to Europeans in India.

Medicinally, they are administered in cases of dyspepsia, characterized by loss of appetite and slow digestion of the food; and in many other diseases of the digestive organs. They are also much employed to cover the nauseous taste of other drugs. Thus the carbonate of iron cannot be taken for a long period by most people, unless aromatics are mixed with it. The nauseous taste of aloes is much lessened by the addition of spirit of lavender;

and even the intensely bitter taste of sulphate of quinine can be concealed by a mixture of valerian, fennel, and orange peel.

It is well to know that aromatics are unsuitable for people disposed to apoplexy. In this country, we rarely, if ever, see any evil effect produced by them; but in the East, such cases are of common occurrence.

ARRACK is the name given to distilled spirits in Asia, and indeed other parts of the globe. Sometimes it is made from the sweet juice of the palm, sometimes from rice, and sometimes from other substances.

ARROW-ROOT.—This farinaceous substance is prepared from the roots of various plants. The West Indian is obtained from the *Maranta arundinacea*. Arrow-root is light of digestion, and therefore suitable for the diet of convalescents from acute diseases. It is used either mixed with hot water, in which case it is generally flavoured with a little wine, or with milk, or in the form of a pudding.

British arrow-root is made from potatoes. All the arrow-roots consist mainly of starch and water.

ARSENIC.—The word arsenic is derived from an analogous Greek word, and is mentioned by some of the early Grecian writers, but its existence as a separate metal can scarcely be said to have been known until about the Christian era.

Arsenic, in its pure form, is a metal, but this metallic arsenic is of no practical consequence. Its oxide, or acid, is called arsenious acid, and is, in moderate doses, a remedy of considerable efficacy, but, in large ones, a most virulent poison. Unfortunately, the facility with which, until lately, it could be procured has rendered it the poison, *par excellence*, employed by the poisoner, particularly among the lower orders. Under this head, we shall first briefly state its action as a remedy, and then the symptoms it produces when given in large doses, and the means, fortunately now infallible, of detecting its presence in the body of a corpse killed by its administration. The unhappy frequency of judicial investigation in cases of death, supposed to be produced by the administration of arsenic, may, perhaps, render this latter of service to some of our readers.

Arsenic administered to man in small doses (about the $\frac{1}{16}$ of a grain, but a combination of it with potash is usually preferred) is tonic and antispasmodic. Hence it is employed in those cases of ague and intermittent painful diseases, where quinine or Jesuit's bark has failed. Strange as it may seem, the peasants of Illyria actually employ it as a seasoning or condiment to their food, and to improve their appetites.

Intermittent diseases are, however, rare in this country; and, even when they do occur, generally yield to the exhibition of Peruvian bark or its

alkaloid, quinine. It is as a poison administered for the purpose of murder, that arsenious acid becomes a drug of fearful importance. When given with the desire of producing death, the following are the symptoms usually to be witnessed:—

Form 1st.—*Acute Poisoning, with symptoms of Inflammation of the Intestines and Stomach.*—This is the usual form. Soon after the poison has been swallowed, nausea and sickness come on, and a very severe burning pain begins in the mouth and throat, and soon extends to the stomach. Usually the thirst is most excessive, and yet there is often a kind of hydrophobic difficulty of swallowing fluids. Very soon the lower part of the alimentary canal becomes likewise affected with a burning pain, and is very tender to the touch. Terrible diarrhoea then comes on. Soon these violent symptoms affect the circulation—the pulse becomes quick, small, and irregular; cold, clammy sweats cover the skin; the heart palpitates, the breathing is short, the tongue dry, furred, and painful, and, on an average, in from one to three days, death takes place.

Form 2d.—*Acute Poisoning, not attended by prominent Inflammation, but by the induction of Coma.*—This form of arsenical poisoning is rare, but of undoubted occurrence. In it the abdominal pains, the vomiting, and the diarrhoea, are either absent or trifling; but from the first there is faintness, insensibility, or delirium, which end in perfect coma. (See Chap. I., Part II., On 'Death.') The greater proportion of cases of this kind have been witnessed, when a very large dose of the arsenic (or arsenious acid, as it ought to be called) had been taken.

Form 3d.—*Acute Poisoning, with symptoms of Abdominal Inflammation, followed by diseased conditions of the Nervous System.*—Sometimes, when the dose has been small, the symptoms described under Form 1st come on; then these disappear, and are followed by affections of the nervous system, sometimes by coma, but more usually by paralytic and tetanic disorders.

The quantity of arsenious acid necessary to induce death is an important question. The smallest dose that we know to be on record that proved fatal, is four grains and a half; and the largest quantity taken that we are aware of, that was recovered from, was about half an ounce.

When arsenic kills, as described in Form 2d, no particular morbid appearances are to be found in the dead body. When, however, death takes place in the manner mentioned in Form 1st, there are some, although of no great practical consequence.

(a) *Morbid Appearances of the Alimentary Canal.*—Here there is usually congestion, often extravasation of blood, frequently ulceration and softening, and often gangrenous spots, all indicative of violent and acute inflammation in the mucous membrane of it.

(b) *Morbid Appearances of the Vascular System.*—Often, but not always, the blood is fluid after death, and dark-coloured. The heart is commonly flabby, and it has been asserted that the inner surface of the heart is red, and covered with spots. The pericardium, or heart's-purse, is usually filled with serum. The other organs of the body are not markedly affected.

An important action of arsenic, which it may be of importance for the jurymen to remember, is, that the body of a man poisoned by this drug is less liable to undergo putrefaction than the body of an ordinary corpse. This antiseptic property of arsenic accounts for the good state of preservation in which the alimentary canal (to which, of course, most of the poison would be at least directly applied) has often been found, months after death, in those poisoned by this drug.

It has been maintained that the bodies of those poisoned by arsenic are particularly liable to be converted into adipocere. (See 'Adipocere.') This, however, is doubtful.

Arsenic not only acts as a poison when swallowed, but also when introduced into the circulation by means of a wound, &c. When introduced in any of these latter manners, the organ mainly affected is always the stomach.

Arsenic also proves fatal, if administered in long-continued small doses, and advantage has been taken of this fact by the poisoner. The symptoms produced by arsenic administered in this manner are various in different cases, but the following is an abstract of those commonly observed:—Disorder of the digestive functions, characterized by flatulence, burning and pain at the stomach; loss of appetite, nausea, thirst, attacks of vomiting and diarrhoea, and, occasionally, salivation. The pulse is small, quick, and irregular; the body wastes; there is headache, giddiness, and want of sleep. There is sometimes, too, numbness and paralysis of the limbs, and now and then there is an eruption on the skin, and the nails fall off. The poisoned man gets worse and worse, and at last dies. In some cases the mind is not affected, but in others delirium or stupor comes on before death.

According to the (somewhat doubtful, however) authority of Hahnemann, a man may be slowly poisoned by arsenic, without the appearance of any well-marked symptoms. "In such cases there is," he says, "a gradual sinking of the powers of life, without any violent symptom; a nameless feeling of illness, failure of the strength, an aversion to food and drink, and all the other enjoyments of life."

We do not possess any chemical antidote to arsenic.

The presence of arsenic in the stomach and intestines of a man poisoned with this drug, can be readily and decidedly ascertained. We will briefly state each test of arsenious acid, its impediments,

and its fallacies, and then the process followed by the medical jurist, when examining the stomach of an individual suspected to have been poisoned by arsenic.

TESTS OF SOLID ARSENIOS ACID.

1. *Volatility*.—Heated on the point of a pen-knife in the flame of a spirit lamp, arsenic produces a white vapour, and then disappears.

Impediments: If alkaline or earthy bases be present, a portion of the arsenic is retained, and prevented from rising into vapour.

Fallacies: Other white substances, as oxalic acid, &c., are volatile, and produce a white smoke when heated.

2. *Garlic Odour*.—If arsenious acid (or an arsenite) be put on a red-hot cinder, a scarcely visible vapour is evolved, having a garlic odour, which, at the distance of an inch or two from the cinder, is converted into a dense white odorous smoke.

Impediment: If organic matter, as flour, be present, the smell of it burning masks the smell of the arsenic.

Fallacy: Phosphorus, and some organic matters, evolve, when heated, a garlic odour.

3. *Formation of a Metallic Crust, or the Reduction Test*.—If arsenic be heated with charcoal in a glass tube, it is deoxidated, and the metallic arsenic is deposited on the sides of the tube.

Fallacy: This metallic crust may, by sublimation up and down the tube, be converted into arsenious acid, and the proper chemical tests be applied to it. If this be done, the reduction test has no fallacy.

TESTS OF A SOLUTION OF ARSENIC, OR ARSENIOS ACID, IN WATER.

1. *Ammoniac-Sulphate of Copper*.—If a solution of this be added to a solution of arsenic, a pale green precipitate (arsenite of copper) is thrown down.

Impediments: Astringent substances, as tea, hinder this test.

Fallacies: Yellow-coloured organic fluids may give a green colour and a slight precipitate, although no arsenic be present.

2. *Ammoniac-Nitrate of Silver*.—If a solution of this be added to a solution of arsenic, a yellow precipitate (arsenite of silver) is thrown down.

Impediments: The presence of free acids and organic matter.

Fallacies: Properly speaking, there are none.

3. *Sulphuretted Hydrogen*.—If this gas be passed through a solution of arsenic, a yellow precipitate (orpiment) is produced.

Fallacy: If the precipitate obtained by this experiment be tried by the reduction test, there is none.

The plan usually followed by the medical jurist in examining the stomach and its contents, of a

man suspected to have been poisoned by arsenic, is this:—First, he looks to see if any white powder is present, and if there is, he ascertains by the above tests whether it is arsenic or not. If no solid arsenic is found, he takes the contents of the stomach, and puts them into a proper glass vessel. He then cuts the stomach into small bits, and puts these among the contents, adding a little distilled water, and a small quantity of aquapotassa. He boils all these for half an hour, and then carefully filters. By this boiling, he gets rid of the fibrine and albumen. He next adds a little acetic acid, which throws down any caseum that may be present, and to remove this, he again filters. Sometimes the liquor is now sufficiently free from organic matter, as to throw down the yellow precipitate with ammoniac-nitrate of silver. If, however, it gives no, or but slight, indication of the presence of arsenic, it is to be evaporated to dryness, and the residuum boiled in distilled water. A solution of arsenic is now obtained, which, if acidulated with acetic acid, can be decomposed, by passing a solution of sulphuretted hydrogen through it. The orpiment thus obtained is tried by the reduction test.

ARTERIES.—Those bloodvessels through which arterial blood flows. They are described in the chapter on 'Circulation.'

ARTICHOKE.—The artichoke contains little nutriment, but is easy of digestion.

ARTICHOKE, JERUSALEM.—This vegetable is a species of sunflower, and its tubers keep fit for use all winter, and contain a good deal of nutriment.

ASPARAGUS.—This pleasant vegetable is very easily and rapidly digested by most people.

Ass.—This well-known and hardy domesticated animal is sometimes employed as a means of affording exercise to invalids. It is particularly qualified for this purpose, by its being deficient in the high metal of the horse. The milk of the suckling female was also, to a considerable extent, once, and even now pretty often, given to people suffering from consumption, or other diseases in which the absorption exceeds the assimilation. The peculiarity of the ass's milk, as compared with that of the cow, ewe, &c., is, that it contains less cheesy matter, or casein. This may render it, although less nutritious, more digestible. But it is very probable that the milk of the ass of this country contains less casein than that of the cow, owing to its almost always being scantily fed. Ass's milk, it should also be observed, contains a large quantity of sugar.

ASSAFETIDA.—This gum resin, obtained from the roots of the *Ferula assafetida*, a perennial Persian plant, is used sometimes as a dietetic, and more frequently as a therapeutical agent. The ancient Romans, and the modern Persians, used it as a common article of food, and it is occasionally,

although rarely, employed in this manner in this country. It has a strong garlic odour of a very penetrating nature, and to most people a most disagreeable flavour. It is a powerful antispasmodic, and is very successfully used in hysteria, colic, asthma, and other analogous diseases.

ASSAYING.—This is a chemical operation, and is in fact an imperfect analysis. It has for its object the testing of how much of one particular metal an alloy or an ore contains. The manner of proceeding differs according to the metal that is assayed for.

Gold and silver are assayed by means of the process called cupellation, which consists in exposing the alloy or ore to heat in crucibles. The substances combined with them become in time oxidated, and the gold and silver are left behind in a metallic state, and can be weighed. The other metals are assayed in various manners, that need not, however, detain us here.

ASTACUS.—The scientific name of the genus of crustaceous animals, that include, among others, the lobster and the crawfish. Both these articles of diet may here obtain a passing notice.

The lobster, or *Astacus marinus* of naturalists, is found in great abundance on most of the rocky coasts of this island. Indeed, wherever it settles itself, it is pretty sure to become abundant, a great many more than 12,000 eggs being laid by one female lobster in a season. Lobsters are very voracious animals, and are generally caught in traps made of wickerwork, and baited with garbage. When caught, they are both killed and cooked by being immersed into boiling water. They are not easy of digestion, and very often produce symptoms of slight poisoning, as vomiting, eruptions on the skin, fever, &c. Indeed, no animal that lives so much as they do upon carrion is very wholesome. They are also often very much undercooked, which adds to their indigestibility.

The crawfish is the *Astacus fluviatilis*, and is common in most European rivers, and is also used as an article of food.

ASTHMA.—See 'Bronchitis.'

ASTRINGENTS.—This word is derived from *astringo*, to bring closer together, and signifies those therapeutical agents that diminish the flow of fluids, perhaps by constringing the solids.—See 'Rhubarb,' 'Gallic Acid,' 'Logwood,' &c. &c.

ASYLUM FOR LUNATICS.—The object of confining an insane person within the walls of an asylum, in which he is subject to constraint, is twofold—preventing the patient from doing injury to himself or others, and facilitating his recovery. According to the strict letter of the law, we suspect that simple insanity, but in which there is no desire manifested to be violent, does not constitute a sufficient reason for confinement in an asylum. But in practice, such is constantly allowed, inasmuch as separa-

tion of the patient from the objects connected with the rise and progress of the malady, and subjection to the moral treatment now afforded by the better class of asylums, unquestionably very often cause, and still more frequently expedite, the cure.

ATOMIC THEORY.—The atomic theory supposes that a piece of any particular kind of matter is not indefinitely indivisible, but is composed of the union of a number of very small ultimate atoms. It further teaches that each atom of a compound body is formed by the union of the atoms of the elements that compose it. It likewise maintains, that each atom of a substance has an invariable weight, and that the weight of any compound atom is the sum of the weight of the atoms of the elements composing it.

ATROPA.—A genus of plants belonging to the Solanææ, containing two species, both poisonous, and one of which is used medicinally.

Atropa belladonna, or deadly nightshade, is represented in Plate xxv., fig. 8. It is not uncommon in the hedges and thickets of this country. Its large flowers have a dingy purple appearance; its berries are of a deep black, and the rest of the plant is of a light-green colour. It grows to about two feet in height. It has a most disagreeable smell, but its poisonous berries are nevertheless sometimes mistaken by children for cherries, and fatal consequences have resulted. Sometimes, too, adults (in one case 150 soldiers suffered from taking them) have eaten, and in all cases the symptoms produced have been very extraordinary. In the first place, there is always dilatation of the pupil of the eye, which is generally so great as to obscure the vision. Thus, in the case of the 150 soldiers, nearly total blindness for a time came on. Then there is delirium, often accompanied by immoderate laughter and constant talking, but with loss of voice. This is followed by stupor, which generally lasts for a day, but which is generally recovered from. Occasionally, however, the quantity of the berries eaten has been so great as to produce death. *Belladonna*, when it has acted as a poison, has almost invariably been taken by accident; but there is one case on record, in which an old woman administered it for the purpose of bringing on stupor, that she might commit a robbery.

The treatment of poisoning by nightshade principally consists in the administration of emetics, in order to free the stomach from the poison.

Besides the berries, the leaves and roots of the plant possess the peculiar poisonous property, and the dried leaves, or the extract of them, are used in medicine, principally applied topically, for the purpose of dilating the pupil of the eye. They are also given as a sedative in painful diseases.

Atropa mandragora, or mandrake, is a still more virulent poison, was formerly used in medicine, and also, as it now is, in the countries where it is com-

mon, popularly believed to possess most remarkable qualities. This curious and very fetid plant has no stem, but its long hairy leaves come direct from its large root, which has been supposed to resemble a human body. Superstition says, that these roots shrink when removed from the earth, and that it is unlucky to meddle with them, and pieces of them are worn as love-charms.

There is a strange account on record of several shepherds, as well as their flocks, having become affected with frantic delirium from eating this herb.

ATROPHY, or wasting, is the name given to the gradual diminution of the tissues of the body, and is caused by the function of absorption being more active than that of assimilation. This may occur from simple fasting, or from inability of the digestive organs to assimilate the nutritious matter taken into the stomach. Hence it is not a disease in itself, but a symptom of many diseases.

ATROPIA.—An alkaloid found in the *Atropa belladonna*.

ATTAR or otto of roses, is an essential oil, obtained in India from the petals of the *Rosa centifolia*, and *R. sempervivens*. It is a very strong perfume, indeed too strong if not diluted, and is employed to scent ointments, &c.

ATTRACTION, CHEMICAL.—See 'Affinity.'

AUGITE.—A mineral, which is essentially a silicate of lime and magnesia.

AURANTIACEÆ.—The natural family of plants containing oranges, lemons, &c.

AUSCULTATION.—This word is derived from *ausculto*, to listen, and signifies the method of distinguishing various diseases, principally of the lungs and heart, by listening to the sounds produced in these organs.—See Part II., Chap. XII.

AVENA.—The botanical name of the genus to which the oat belongs.—See 'Oat.'

AXILLA, in botany, is the name of the angle formed by the separation of the leaf from its stem.

AXILLA, in anatomy, is the armpit.

AZOTE.—See 'Nitrogen.'

BALSAM.—This word includes substances of a very different nature. Properly speaking, it means those substances which exude from trees, and consist of benzoïn and resin. The true balsams, then, are—balsam of Peru, of Tolu, benzoin, storax, and liquid amber; but the word balsam is also often applied to certain turpentine.—(See 'Canada Balsam,' and 'Copaiva.') In this place, however, we only notice the true balsams.

The therapeutical action of them all is the same. They are mild stimulants to the mucous membranes, and are antispasmodic. Hence they are useful in cases of chronic bronchitis and asthma. The most active of them is benzoin, and it forms a constituent of the famous paregoric elixir, so much administered in these affections.

Solutions of some of them in spirits were formerly much used as applications to fresh cuts, with a view of exciting union by the first intention, and also to indolent ulcers. Such a solution generally went by the name of Friar's Balsam. Used in the former of these manners it is injurious, but it may sometimes be useful in the latter.

BALSAMODENDRON.—This is a genus of oriental plants, from one species of which the gum resin called myrrh is obtained, and from another the improperly so named balsam or balm of Gilead.

Myrrh is a stimulant and tonic, and it has an astringent effect upon mucous membranes, and is useful in chronic bronchitis, asthma, &c. Applied locally, it is an astringent, and enters into the composition of a great many of the tooth powders sold in the shops.

Balm of Gilead is very much esteemed in the East, and is so dear that the best kind is never sent to this country, and even the inferior is generally much adulterated. It is never used in regular practice, and the empirical preparations sold in the shops bearing the name do not contain any of it. Solomon's balm of Gilead, for example, is made of brandy, cardamoms, and a little cantharides.

BANNANA.—See 'Musa.'

BANDAGE is the term employed by surgeons to designate the strips of cloth, &c., by means of which dressings are kept to wounds, cut surfaces united, splints kept on broken bones, &c. They are now often made of india-rubber interwoven with cotton.

BARBEL.—The name of a large fresh-water fish, common in sluggish rivers in England. There they sometimes attain a weight of twenty pounds. Their flesh is coarse, and at particular seasons of the year their roe becomes poisonous. This was known to the earliest English writer upon angling, Dame Juliana Berners, who mentions the circumstance; and from this lady we also learn that our ancestors were in the habit of eating fish raw. She says that the *uncooked* roe of the barbel is even additionally poisonous.

BARILLA.—Impure carbonate of soda.

BARK.—This is the external coat of the stem and branches of vegetables, and encircles the wood. It often contains aromatic and other principles, and therefore the bark of many trees is used in medicine.

BARLEY.—This well-known grain is distinguished from the other cereals by its pointed extremities, and the rough appearance of its outer skin. It was, in the earlier periods of the world, much cultivated to serve for human food; but in this, as in many other countries, it has been superseded for this purpose by wheat. Of all the grains it most readily germinates, and is, therefore, the one fixed upon for malting purposes.

Pot barley is barley from which the outer husks have been removed, and pearl barley that which has, in addition, been deprived of a considerable portion of the grain itself. The rationale of these operations depends upon the fact, that the outside contains the oil, while the inside consists of gluten and starch.

Barley can ripen in almost every climate, from that of the tropics to almost that of the frigid zones. Hence it is particularly suitable for an emigrant's crop.

BASALT.—This is a hard igneous rock, principally composed of hornblende, (or of augite,) felspar, and iron.

BASILICON.—The old-fashioned name for the stimulating resin ointment.

BASSIA.—The name of the genus of Indian trees, several varieties of which contain so much oleaginous matter, that they afford butter to the natives. This butter is likewise considered to be very efficacious when rubbed upon joints enlarged from rheumatism.

BATATA CONVULVULUS.—This tree was introduced from the Malayan Archipelago into Spain and France, and cultivated there for the sake of its tubers, which were sometimes imported to Britain, and called potatoes. It is important to recollect, that the potato of the older writers refers to this tuber, and not to the modern potato.

BATH.—This is the principal city in Somersetshire, and has been famous for a very long time for its medicinal waters. It possesses four naturally hot springs. The temperature of three of them are as follows :—Hot Bath, 117°; King's Bath, 114°; Cross Bath, 109°. These waters contain sulphate of lime, muriate, and sulphate of soda, a little carbonic acid, iron, &c. They are stimulant, and are used both internally and externally, particularly in cases of chronic palsy, rheumatism, skin diseases, &c.

BATH, COLD.—The temperature of a cold bath should not exceed 65°; the tepid bath rises to about 92°, and the hot bath to about 106°.—For the effects of bathing, see p. 103.

BEAN.—This is a leguminous plant, cultivated in the fields for its ripe legume, and in the garden to be eaten in an immature state. There are two distinct kinds—the common or broad bean, and the French or kidney bean. The principal use of the former is to feed horses and pigs. The latter are used in a fresh state, or salted, and sometimes, but not often in this country, their matured seeds or legumes are consumed.

BEAR.—The flesh of the bear, in the countries where it occurs, is eaten, and is wholesome.

BEAVER.—The flesh of this animal is also wholesome, and much relished by the Indian and Canadian hunters. It resembles pork in its flavour, and the epicure's bit is said to be the

tail, which contains a quantity of a peculiar fatty gristle.

BEE.—See 'Honey' and 'Wax.' The best application to the swelling caused by the sting of a bee, is a little diluted ammonia, or some eau de cologne.

BEEF.—In this country, the term is confined to the flesh of the ox or cow. In other places, the flesh of slaughtered horses and bears is also called beef.

BEER.—See 'Brewing.'

BEET.—In Britain, the garden beet is grown for the purpose of affording a winter salad. The root is boiled, sliced, and placed in diluted vinegar, and forms a very wholesome and healthy condiment. A field beet is also grown in the south of the Island for the purpose of feeding cattle, particularly milch cows. Sugar can be extracted from the beet; and it is affirmed, on good authority, that sugar might be in this way profitably produced in Britain, and sold at the rate of twopence-halfpenny a pound.

BENZOIC ACID.—This acid is usually, as its name indicates, derived from the gum benzoin, although it may be procured from other sources. It is frequently called flowers of benjamin. It is used by perfumers, but not by modern physicians.

BERGAMOT.—This is the fragrant fruit of a species of citrus, from the rind of which is extracted the essence of bergamot of the shops. It is only used for perfumery.

BERRY.—In botanical language, a berry is a soft and succulent fruit, having its seeds lying loosely among pulp.

BETULA.—The name of the genus birch, from the sap of the common species of which a very good wine is made.

BEZOARS.—This expression is derived from some Persian words that imply, "the expelling of poison." They are substances, or concretions, formed in the intestines of animals, particularly of animals that live upon oats with the husk on, and were in Europe, as they still are in the East, considered to be antidotes to all poisons. So much are they esteemed, that they are said sometimes to fetch ten times their weight in gold.

Spurious bezoars are occasionally sold for genuine ones; and, in the writings of the older physicians, the word bezoar was commonly applied in our sense of specific, and many artificial bezoars were recommended. One of the most famed of these was composed of the liver of vipers and other offensive offal, and was called the "animal bezoar."

BILE.—This animal excretion is separated from the blood at the liver, and is mainly intended to discharge effete carbon from the system. (See p. 39.) It is poured into the smaller intestines, and when that inverted action of the stomach

that we call vomiting has emptied the contents of that viscus, bile is ejected.

BILIOUS.—This is another word for dyspeptic, and the bile has got nothing to do with it, except in the cases of long-continued vomiting just mentioned, when some of it is forced up into the mouth.

BILL OF HEALTH.—See 'Quarantine.'

BILLS OF MORTALITY.—These are returns of the number of deaths that occur in a given district during a particular period, specifying also the different diseases, and showing, at any rate in decennial periods, the ages at which the fatal results took place. Formerly, in England, these bills were confined to a portion of London, but now they extend over the whole of that part of Britain, and the results that are thus every year obtained will doubtless lead to great sanatory improvement.

BIRDS.—These constitute a class of vertebrated animals, distinguished by being oviparous, and covered with feathers.

BISCUIT.—This word is derived from *bis*, twice, and *cuit*, cooked, implying the thorough firing that this kind of bread receives. Biscuits are usually made in the form of flat cakes, so as to enable their manufacturer to express as much of the water as possible, for the purpose of making them keep during long voyages. Emigrants, too, must often have to trust to biscuits for their glutinous and farinaceous source of food.

In order to make biscuits that will keep without going mouldy for a long time, it is indispensable that meal of the soundest quality should be selected. This meal is mixed with water, and the dough is kneaded by a long pole worked with great force. When the dough is sufficiently kneaded, it is divided into small lumps, each sufficient for one biscuit; and each of these is again submitted to a kneading process, manual labour being this time employed. They are then flattened, pierced with holes, and put into the oven. It is now the practice to complete the firing at once, and hence the term biscuit is not now exactly correct.

The articles sold in the shops as sponge biscuits, &c., are pieces of confectionary, and have nothing to do with biscuits.

BISMUTH.—This is a metal, of which the nitrate is used in medicine.—See p. 140.

BISON.—This is the name of a variety of the ox, nearly extinct in Europe, but still abundant in America. Their beef is considered to be very superior, and to bear the same resemblance to stall-fed beef as venison does to mutton. The two most delicious parts are said to be the tongue and the hump, which latter is characteristic of them.

BITTERN.—This genus of the heron family is now almost extinct in Britain, and is scarcely ever seen at table. But before the country was

enclosed, it was a common bird, and its flesh was very much esteemed. The flavour of it was thought to resemble that of the hare.

BITTERS.—This is the name given to that class of medicinal agents characterised by their extreme bitterness when taken into the mouth. They increase the tone of the stomach, and render the digestion of food more easy. Hence they constitute a valuable section of tonic remedies.

BITUMENS.—These are caused by the partial decomposition of fossil trees. Their action upon the human body is somewhat similar to the balsams, but they are scarcely ever used.

BIVOUAC.—This word means the outdoor night quarters of an army that has no tents along with it. It is equally applicable, at least occasionally, to emigrants. In order to render it as little injurious to the health as possible, fires are lit, shelter is obtained from branches and the like, and, if the cold be great, the individuals so situated should lie close together.

BLACK COCK.—This is a common name of the male of the black grouse. It is the largest of the birds (with one exception) found in a wild state in this country, usually employed as food. The flesh is considered easy of digestion. The female is often called a grey hen.

BLACK LEAD.—See 'Plumbago.'

BLADDER.—The organ that receives the excretion of nitrogen, &c., from the kidneys.

BLEAK.—A small fresh-water fish.

BLEEDING.—The operation by which blood is removed from the body.—See p. 125; and for the mode of performing venesection, Appendix III., on 'Popular Surgery for Emigrants.'

BLIGHT.—A popular name for an epidemic among plants.

BLINDNESS.—See Appendix II.

BLISTERS.—See p. 126.

BLOOD.—The nutrient fluid of animals, which is constantly receiving supplies from the organs of assimilation.

BLUE PILL.—See 'Mercury.'

BOHEA.—The common kind of black tea.—See 'Tea.'

BOIL.—This is the popular name of the phlegmon or furunculus of systematic writers. It is a circumscribed inflammation of the skin and subjacent cellular tissue; it may occur on any part of the body, and varies in size from the bigness of a pea to that of a pigeon's egg. It is always broader at the base than the summit, and often exquisitely tender. It terminates in the formation of pus, but always small in quantity. The first symptom of amendment is a few drops of this pus, mixed with blood, escaping from the apex of the boil, leaving behind it, in the boil, a clot of tenaceous purulent matter, called the core. This next comes away, and then the boil gets well.

Sometimes, particularly in delicate children, boils are attended by considerable fever, but the disease is never dangerous.

Although the disease is situated in the skin, it is caused by disorder of the organs of assimilation.

The local treatment consists in promoting suppuration by fomentations, poultices, and the like; and the general, in the administration of purgatives, alteratives, and tonics.

BOILING OF FLUIDS.—When almost all fluids are heated up to a certain extent, the attraction between their particles becomes so much diminished, that they become converted into vapour. Different fluids vary as to the degree of heat at which they boil. Thus, muriatic æther boils at 52°, water at 212°, and mercury at 662°.

BOLE.—This is an earthy mineral, found in America, Saxony, the Isle of Skye, and several other places. It is a silicate of alumina and iron. It was formerly in much repute as a drug, and the iron that it contains doubtless renders it a tonic, but it is now only used in veterinary medicine.

BOLETUS.—This is a species of fungus, the dried powder of which is sometimes used to arrest hemorrhages. It constitutes German tinder, as it is called, and is also sometimes used as a moxa.

BOLUS.—An old-fashioned form of administering two or three pills rolled up into one.

BONES.—The skeleton of the higher animals.—See p. 34, and following.

BONES, DISEASES OF.—These are caries, necrosis, and softening.—See Appendix III., on 'Popular Surgery for Emigrants.'

BOOBIES.—This is the gannet, or solan goose. In Scotland it is often eaten. It is remarkable for its strong fishy flavour, but seems to be wholesome enough.

BORAX.—This is the borate of soda. It is slightly astringent, and, mixed with honey, is often applied to the sore mouths of children. It is also, in the proportion of a drachm to four ounces of water, used as a gargle in sore throats. A solution of borax is likewise said to be the best application for relieving the red nose of delicate people.

BORECOLE.—This is the name of the winter cabbage that does not heart, and of which the best variety is Scotch kail. It is remarkably nutritious.

BORON.—One of the elementary bodies.

BOTANY.—That branch of physical science that comprehends all that relates to vegetables—the structure of plants, their habits and properties, their use to man, their arrangement, &c.

BOTS.—These are the larva of gadflies, and are very often swallowed by our domesticated animals, and occasionally by man.

BRAIN.—For the anatomy and physiology of this important organ, see p. 44 and following, and

for its diseases, Chap. VII., VIII., and XXX., in Part II.

BRAMBLE.—This is a well-known fruit-bearing wild bush, the fruit of which is quite wholesome.

BRAN.—This is the outside of grain. As it contains the greater quantity of the oil, taking it away renders the food less nutritious, but habit has rendered it more palatable.

BRANDY.—This is alcohol extracted from wine, as distinguished from alcohols distilled from other fermented drinks. It differs in its physical properties from such, owing to the presence of a little peculiar oil, æther, &c.

In wine-producing countries, brandy is obtained indifferently from either red or white wines. It is also procured from the *marc*, or residue of the grapes, after the wine has been poured off; but this has always an inferior flavour, owing to the presence of a peculiar oil, formed, probably, in the half-decomposed skin of the grape.

Brandy, besides being a stimulant, is, owing to its volatile ingredients, a stomachic. Almost all, if not quite all, the brandy consumed in this country comes from France. It is somewhat curious, that, although the grog of our navy used to be made of Spanish brandy, we now import no brandy from Spain.

BRANDY, BRITISH.—This is an alcoholic drink, generally distilled from fermented potatoes. It is all very well to sell it as a peculiar spirit, but to call it brandy, i.e., obtained from grape wine, is a near approach to a fraud.

BRASS.—This is the name of an alloy of copper and zinc, which is very much employed for many economical purposes.

BREAD.—This important article of diet may be divided into two classes—the unfermented breads, as biscuits, (which see,) and the fermented. The former is the more economical, as the fermentation dissipates a certain amount of flour into the air in the shape of gas; but, in doing this, it makes the structure porous, which seems to be the end aimed at. It is important to remember that no chemical difference exists between fermented and unfermented bread, and that the difference entirely results from their physical structure in this matter of porosity.

Bread essentially consists of albuminous, saccharine, and some oleaginous vegetable principles in a state of fine division, mixed with water, a portion of which water is afterwards, by the action of heat, evaporated. Practically, however, common salt is always added. As all the common cereal and leguminous seeds contain albuminous, saccharine, and oleaginous principles, any of them ground down may be used for making fermented bread; but, in this country, wheat flour is the one almost invariably fixed upon.

Flour, then, is mixed with water, the mixture

obtaining the name of dough. This, if placed in a warm place, has a tendency to ferment; that is to say, a portion of its sugar and starch have the tendency to part with carbonic acid, and thereby become converted into alcohol. When this is the case, the carbonic acid, ascending in bubbles, makes the required porosity, and the heat evaporates (now and in the oven) the alcohol that is formed.

As, however, dough by itself is sometimes long in fermenting, and becomes mouldy in the process, it is usual to add something to it that may exercise upon it a catalytic action. Formerly, a piece of old bread or dough was added to the new dough, and was found to produce the desired effect. Afterwards, the yeast, or balm, that rises to the top of the fermenting vats of the brewer, was found more effectual.

When the bread has fermented, or risen, as it is commonly called, it is put into an oven, where the heat drives off so much of the water and the alcohol. In a large bakehouse, the quantity of the latter that is thus formed in a day is considerable, and has sometimes been condensed.

It is obvious, however, that if the alcohol is allowed to evaporate, a certain quantity of the sugar of the dough is wasted for the mere purpose of sending carbonic acid through it; and it becomes an important economical question, whether this carbonic acid could not be forced through it at a small or at no cost, without thus destroying a quantity of the sugar or starch of the flour.

It is found that this may be done at no cost whatever. As before mentioned, bread always contains salt. Salt is a compound of muriatic acid and soda. If we mix together in the dough muriatic acid and carbonate of soda, the result is, that common salt (which mixes with the dough) and carbonic acid (which rises through the dough and makes it light) are formed. In this case we have bread without the waste, but with the properties of the fermented bread. Unless the materials employed, however, are pure, they communicate a yellowish tinge to the bread.

BREAKFAST.—This is the earliest meal, and, until it has been taken, the system does not altogether recover from the effects of the previous day's labour. The kind of breakfast taken—porridge and milk; tea and coffee, with bread, fish, eggs, or meat; or soup, with bread, and wine, and meat—entirely depends upon the habits and modes of life of the consumer. Perhaps, upon the whole, the first and the last are the best.

BREAM.—This is a fresh-water fish, commonly about half-a-pound in weight, but sometimes larger; rather insipid, and troublesome with its bones, but perfectly wholesome.

BREWING, like wine-making, is the conversion of a solution of sugar into alcohol and water,

but it differs from that process in two respects. In the first place, the sugar in the grape is naturally formed in that fruit; and, in the second place, the matter that catalytically promotes the change in wine-making is the gluten of the skin of the grape, while, in brewing, it is artificially added from without in the shape of yeast, or balm.

The process of brewing is essentially this: the malt is bruised in order that the water may extract its sugar; hot water is then poured over it, and the solution of sugar thereby obtained is called a mash, and, when cooled, a wort. Afterwards, hops are put into this wort, for the purpose of communicating an aromatic bitter taste to it. (We may here remark, that although now-a-days hops are considered essential to beer, the original old-fashioned beer contained none.) Yeast is then added to it, and the change of the sugar into the alcohol immediately begins, carbonic acid being given off. When it is cleared, the liquid is beer. We should, perhaps, add, that beer also differs from wine in containing no tartaric acid.

BRISTOL HOT WELL.—This is a warm spring, the supposed good effects of which, in consumptive cases, are probably to be ascribed to the very mild climate of the locality.

BROCOLI.—A hardy variety of cauliflower, the head or flower of which is the most nutritious of all vegetables, with the exception of mushrooms.

BROMINE.—This is one of the elementary bodies of chemistry.

BRONCHITIS.—This is inflammation of the lining membrane of the bronchi.—See Part II., Chap. XIII.

BRONCHOCELE.—This is sometimes called goitre, or Derbyshire neck. It consists of an enlargement of the thyroid gland, not attended with pain, free from danger, but, when large, forming a very ugly appendage. It is a disease of endemic origin, being almost confined to certain localities—as Switzerland, Savoy, and Derbyshire; but it is not known what are the particular causes that excite it. In Switzerland, it is connected with cretinism; but in England, those who suffer from it have their bodily and mental faculties as well as their neighbours. It almost always, at least in this country, yields to the internal and external exhibition of iodine.

BRONZE.—This is an alloy of copper and tin. It sometimes also contains zinc and lead.

BROOM.—See 'Spartium.'

BRUCIA.—An alkaloid contained in the bark of the false angustura, of a very poisonous nature, its actions being the same as strychnia—(which see.)

BRYONY.—The root of this native plant is a drastic cathartic, never now prescribed.

BUCKTHORN.—See 'Rhamnus.'

BURGUNDY.—The best class of still French

wines are, as a class, called Burgundy. They very seldom find their way to this country.

BURNS.—See Appendix III., on 'Popular Surgery.'

BUSTARD.—This is the largest of our game birds, but it is unfortunately now almost extinct.

BUTTER.—In hot countries, the inhabitants obtain their supply of oleaginous food mainly from vegetable oils, as olive and poppy oils. In this country, we depend in a great measure upon the fat or oil contained in the milk of the cow. This butter, as it is called, is contained in little cells, which are easily burst by the application of a little heat. To separate it from the cheesy and whey parts of milk, a little heat is applied, the cells then break, and their contents adhere together. This is sometimes, as in Devonshire, done by putting the cream near the fire; but the common plan is to use heat derived from friction, as in the common churn.

BUXTON WATERS.—These are warm springs impregnated with carbonate of lime, and their use, both internal and external, is thought useful in cases of rheumatism, chronic gout, &c. There is also at Buxton a chalybeate spring. Owing to the beauty of the adjacent scenery, Buxton is a favourite watering-place, and it is to this cause, perhaps, more than to the springs, that we should ascribe its efficacy.

CABBAGE.—This is the *Brassica oleracea* of botanists, and of it many varieties exist. They may all, however, be referred to the close-hearting and the spreading kinds. The latter of these is called *kail*—(which see.) Cabbage is a nutritious article of diet, and is somewhat remarkable for being rich in potash. It also contains a large quantity of oleaginous matter, which has an offensive odour, but which is separated from the vegetable by the process of boiling. In many parts of the continent, cabbages are preserved over winter by a peculiar process, and the product obtained by it, or *sour kroust*, is very useful as an antiscorbutic, in places where a liberal supply of potatoes cannot be obtained. It is prepared in the following manner: the cabbages are sliced thin by hand, or, in large families, by a machine, constructed for the purpose. The bottom of a cask, out of which the head has been taken, is covered with a layer of salt; over this a layer of the sliced cabbage, six inches thick, is placed, and these alternate layers of salt and cabbage are continued until the cask is filled. Commonly, too, whole peppers and juniper berries are intermingled with the mass. When the cask is full, a board, having a heavy stone upon it, is placed over the topmost layer. A fermentation, the nature of which is not very intelligible, begins, and the cabbage diminishes in bulk. Fresh cabbage and salt are put in to occupy the space then vacant, and the scum that rises to the top is care-

fully skimmed off. In a few days this fermentation ceases, and the *sour kroust* is ready for use. It is usually eaten raw.

CACAO.—This is commonly written *cocoa*. It is the bruised seeds of the *Theobroma cacao*, a tree inhabiting the West Indies, Brazil, &c. These seeds contain a fixed concrete oil, and an aromatic principle. Simply bruised, they constitute the *cocoa* of the shops; and when reduced to a paste, and mixed with vanilla, &c., they become chocolate. Both, dissolved in water or milk, are common beverages in this country.

CAFFEINE.—This is a neutral vegetable principle contained in coffee.

CAJUPUT.—See 'Melaleuca.'

CALAMINE.—See 'Zinc.'

CALAMUS.—This is the name of the genus of palms, the different species of which constitute the rattan canes of commerce. This name is likewise given to a resin obtained from many species of the palm, and known in the shops as *dragon's-blood*. It was formerly used in medicine, but it now only forms an ingredient in tooth-powders.

CALCIUM.—This is the metal of which lime is the oxide.

CALCULUS.—This is the general name for inorganic concretions that sometimes occur in the human body. They are most frequently met with in the bladder and gall-bladder.

CALMUCKS.—This is the name given by the Russians to the principal branch of their Mongolian subjects. They are nomadic in habits, and in religion, like almost all other Mongols, *Bhuddists*.

CALOMEL.—The chloride of mercury, in very common use as a purgative, alterative, and mercurial.

CALORIC.—See 'Heat.'

CALUMBO.—See 'Cocculus.'

CAMBEO.—This is a gum resin, secreted probably by the *Stalagmites cambogoides*. It is a drastic purgative, of a fine yellow colour—far more used, however, as a pigment than as a drug. It enters largely into the composition of Morrison's pills; and it is this ingredient that has sometimes rendered them fatal.

CAMOMILE.—An infusion of the flowers of this plant is in small doses tonic, and in large ones emetic. It is figured in Plate XXV., fig. 3.

CAMPHOR is the stearine of the oil of two oriental trees. It is a peculiar substance, representing, as has been observed, "the volatile oils in a fixed state." It is very volatile, and has a peculiar but pleasant odour. Few insects can endure this smell, and hence camphor is a protection to stuffed birds, dried plants, furs, and the like. It is regarded as a powerful stimulant of the nervous system. It is also employed as an external application.

CANCER.—This is also called Carcinoma. Two states of it exist—the one, in which there is a hard, painful tumour, called scirrhus; and the other, in which that tumour has begun to ulcerate, or cancer proper. Scirrhus is not merely abnormal nutrition, but the deposition of morbid matter, unknown in a state of health. It generally occurs in glandular parts; and if not at once removed, the lymphatics absorb the morbid matter, and transmit it to other parts of the system.

CANE.—See 'Calamus.'

CANELLA ALBA.—This is a West Indian tree, the bark of which is an aromatic tonic.

CANINE MADNESS.—See 'Hydrophobia.'

CANTHARIS OFFICINALIS.—This is a beetle which is extensively employed to raise blisters. The volatile principle exhibited by the living insects, is so pungent as to cause great irritation upon those who approach the trees on which they alight. They are noticed to become somewhat torpid and less venomous at night, at which time they are collected by persons who kill them by the application of fumes of vinegar. They are called Spanish flies, but the greater quantity of those brought to this country come from Russia. They owe their activity to a peculiar principle called *cantharidin*.

CAOUTCHOUC.—This remarkable and useful substance is procured from many trees growing in South America, Sumatra, India, &c. It is generally called India-rubber, on account of its property of obliterating the marks of black-lead pencil from paper. When pure, it is quite white, without smell or taste, very elastic, insoluble in water and alcohol, but soluble in æther and naphtha.

The elasticity of caoutchouc is most remarkable. A piece of it may be stretched to seven or eight times its ordinary length without being torn. When exposed to heat it fuses, but on cooling does not resume its former appearance, but assumes the consistency of tar. In South America, it has long been used for making waterproof boots, and the many appliances of this nature to which it has been put in this country are very well known. Waterproof cloth is prepared by dissolving caoutchouc in the oil obtained from gas tar, spreading it on the surface of a piece of cloth, upon which a similarly spread piece is applied, and the two made to conjoin by the application of powerful pressure. This fabric is quite impervious to water.

Caoutchouc is now used also for bandages, and many other surgical purposes.

CAPRIC ACID.—This is a peculiar acid, said to occur in the milk of the goat and cow.

CAPRICUM, or Bird Pepper, is a genus of solanaceous plants, the fruit and the seeds of which contain a peculiar pungent principle. On this account, both fruit and seed—either in the unprepared state, or ground (in which case they consti-

tute Cayenne pepper)—are much used as a condiment. In this country, we only employ capsicum in seasonings and pickles; but in hot climates, its large consumption seems to be necessary to digestion. Even birds in such countries cannot exist without it, and parrots have been known to die on their voyage to this country, from being deprived of a supply of bird pepper.

Cayenne pepper is also used as a drug. In relaxed sore throat, it is employed to form a gargle; and, on account of its rubefacient properties, it is sometimes preferred to common sinapisms. It is likewise used in atonic dyspepsia. The most agreeable form of thus taking it being, perhaps, as Chili vinegar at table.

CARBON.—This is an elementary chemical substance, of which the most familiar example is charcoal. This is procured by burning either animal or vegetable matters. It is a dark, inodorous, tasteless substance, insoluble in water. It has the power of absorbing gases, and hence is used to remove the taint from slightly decomposed meat and game, to destroy the fetor of sores, to annihilate the smell that arises from the feet of some individuals, and in cases of foul breath. It also destroys colours, and hence forms one of the best dentifrices that we possess.

CARBONIC ACID.—This compound of carbon and oxygen is produced by respiration, by combustion, and by the vinous fermentation. It is a very deadly poison to animal life.—See Chap. XXXI., Part II.

CARDAMOMS.—These are the aromatic capsules of different species of Amomum. They are used to a considerable extent in medicine as aromatic adjuncts, commonly to tonics.

CARDITIS.—This is inflammation of the heart.—See Chap. XVII., Part II.

CARDOON.—This species of artichoke is little used in this country, but forms in France a very considerable article of vegetable diet.

CARMINATIVES are medicines that possess the power of expelling flatulence from the stomach. They are almost always aromatic vegetables, and owe their property to the volatile oil that they contain.

CARMINE.—This beautiful pigment is obtained from cochineal—(which see.)

CARNIVORA.—A term generally applied to those animals that live on flesh, but often restricted to mammals that do so.—See Chap. I., Part I.

CARP.—This fresh-water pond fish is remarkably prolific in small sheets of water, and as it is a wholesome and pleasant article of diet, it is perhaps worthy of a more extended notice than it receives. The proximity of almost every part of Great Britain to the sea, however, renders all fresh-water, and particularly all pond, fish neglected.

CARRARA WATER.—This is lime-water impreg-

nated with carbonic acid. As an ordinary beverage, it is in no degree superior to soda-water.

CARROT.—This is the fleshy root of the *Daucus carota*. Carrots are a nutritious article of vegetable food, and they contain sugar, which may be extracted from them, or converted into wine.

CARTILAGE.—This is the scientific name of gristle.—See page 36.

CARYOPHILLUS AROMATICUS.—This is the tree from which cloves are obtained. (See Plate XXIX.) It is a native of the Moluccas. Cloves are very much employed for culinary purposes, and in medicine they are used as aromatic stimulants. Oil of cloves is also sometimes introduced into a carious tooth to relieve the pain of toothache.

CASCARILLA.—This, in South America, is the name given to all kinds of tonic barks, including the cinchonas, but in this country it is restricted to one kind obtained from the croton cascarilla. It is an aromatic tonic.

CASSAVA, or Manioc, is a nutritious farinaceous article of food, obtained from the roots of the *Jatropha manihot*, and other allied species. This plant, which is a native of the West Indies, also abounds with an acrid and poisonous juice, which, however, is so volatile as to be driven off at a low temperature. In order to obtain the cassava, the roots are ground in a mill, and squeezed, which latter operation expels part of the poisonous matter. The residue is heated over a brisk fire, and stirred until it become solid. This is cassava. A variety of cassava is sold in the shops of this country, under the name of tapioca.

CASSIA.—This is a genus of leguminous plants, from which senna is obtained.—See 'Senna.'

CASSIA BUDS.—These are the unexpanded flowers of a species of cassia, used as a spice. In taste and smell they resemble cinnamon.

CASTANOSPERMUM, a leguminous tree, a native of New Holland, growing to a large size, and the seeds of which are used as food.

CASTOR is an excretion found on the beaver—sometimes used as an antispasmodic.

CASTOR OIL.—See 'Croton.'

CATALEPSY, or Trance, is a disease of the nervous system, characterized by loss of motion and intellectual operations.

CATAPLASMS, or Poultices, are substances applied to the outside of the body, either to allay pain and relieve inflammation, or, what is more commonly the case, to promote suppuration in cases of inflammation, and alleviate the pain. To effect the former purpose, they are generally applied cold—the latter, warm. Bread, linseed meal, bran, roasted figs, and other substances, are employed for making them.

CATARRH, or Cold, is inflammation of the lining membrane of the nostrils, frontal sinuses, and adjacent parts, attended by a little sympathetic fever.

It is generally brought on by exposure to cold, when the body has cooled. Keeping the house, bathing the feet, and taking warm drinks, are the treatment usually necessary.

CATECHU is the name of the inspissated extract of the *Acacia catechu*. In appearance it somewhat resembles red earth, and is known by the name of *Terra japonica*. It contains a large quantity of tannin, and is a useful astringent.—See Chapter V., Part II.

CATHARTICS is a name given to the more active purgatives.

CAULIFLOWER is the name given to the esculent vegetable that consists of the undeveloped inflorescence of a variety of *Brassica oleracea*. It is nearly, or altogether, analogous to brocoli, and, like it, very nutritious.

CAUSTIC.—See 'Escharotics.'

CAYENNE PEPPER.—See 'Capsicum.'

CELERY, or Apium graviolens, is a mild indigenous plant, of a poisonous nature; but when cultivated in our gardens, it becomes a wholesome and much-esteemed winter salad, and is also used as an ingredient in soups.

CELLULAR TISSUE.—This is one of the elementary tissues of the body.—See p. 37.

CENTAURY.—This is a genus of plants, comprehending the blue bottle, blessed thistle, and other plants, formerly much esteemed, but now quite neglected.

CERASIN.—This is a peculiar gum, that exudes from the cherry and plum tree.

CERASUS.—This genus of plants comprehends all the cherries.—See 'Cherry.'

CERATES.—This is the name given to external applications that contain wax. They, like ointments, are now much less used than they were wont to be.

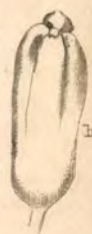
CERIUM.—This is a metal, but neither it nor its compounds are of any practical importance.

CERUSE.—See 'Lead, Carbonate of.'

CETINE.—This is the crystallizable matter that forms the greater part of spermaceti.

CHABLIS.—The name of one of the Burgundy white wines.

CHALK.—This is carbonate of lime. It would appear that, at an early period in the history of the globe, the lime contained in its crust was combined with sulphuric and other acid, but very little with the carbonic. After the creation of vegetables, a great part of this lime would pass into their structures, and these vegetables would be consumed by animals, who would then appropriate the lime. When lime enters into the composition of animals, it, in the higher animals, principally unites itself with phosphoric acid, forming phosphate of lime, as seen in the bones; but when it is assimilated by radiated and molluscos animals, it is always associated with carbonic acid, forming carbonate of



EUGENIA CARYOPHYLLATA.
THE CLOVE SPICE TREE.



lime, or chalk. And this chalk is, in fact, the remains of the shells of myriads of these animals.

Accordingly, chalk is found in all those geological formations that have had animals dwelling upon them; but, in the newest of the secondary formations, these creatures have lived in such numbers, that their remains form huge beds of chalk, and give a name to the formation itself. This chalk, or cretaceous formation, occupies a large extent of the south of England and the north of France; and some idea may be formed of the number of the animals that formerly inhabited it, when it is considered that some of the beds of chalk are a thousand feet in thickness.

Chalk is an antacid, but, in cases of acidity of the stomach, it is rarely prescribed, the preference being usually given to some form of potash, soda, or magnesia; and its use is principally confined to cases of slight cholera in adults, and to children whose digestive organs are suffering from the irritation of teething. It was formerly considered to have a specific effect over the lymphatic vessels and glands.

CHALYBEATE SPRINGS.—These are mineral waters, of which the preponderating ingredient is some salt of iron. More commonly it is the carbonate. They are known by their inky taste, and by the yellow appearance of the ground over which they flow. The most important of the chalybeate springs of Great Britain are those of Bath, Harrogate, Tunbridge, Holywell, and Hartfell. They are all tonic, and, in cases where the blood has become impoverished, often of great use.

CHAMPAGNE.—This wine occurs in two forms, the sweet and sparkling, and the still and dry. This difference depends upon the mode of management of the wine in the cask, and during bottling.

CHARCOAL.—This is the impure carbon obtained from the decomposition, by heat, of woody matter, from which air is excluded. During this operation, the more volatile of the ingredients of the wood are expelled, but the carbon that remains behind has the saline matter of the plant associated together with it as impurities. For its properties, see 'Carbon.'

CHARCOAL, ANIMAL.—The impure variety of this sold in the shops is called ivory, or bone-black.

CHARD BEET.—This is a variety of beet, grown, however, not for the sake of its roots, but for the strong succulent ribs of its leaves, which are cooked and eaten like asparagus, or sea-kail.

CHEESE.—The milk of animals consists of three substances—the oily, or the butter; the saline, or the water and sugar; and the albuminous. All these may be separated, and the last-mentioned, when prepared by itself and salted, constitutes a very nutritious and very important article of diet, called cheese.

Cheese-making essentially consists in adding acid to the milk, upon which the casein or curd immediately coagulates, and falls to the bottom. It contains, mechanically mixed with it, a large quantity of whey, which is separated by pressure. Notwithstanding, however, the simplicity of cheese-making, the cheeses of different countries differ very much from one another. This depends principally upon the management, but partly, no doubt, upon the kind of cows, and the food which they receive.

The acid used to coagulate the milk in this country, is that contained on the surface of the stomach of a calf, and is, in reality, muriatic acid. In Holland, muriatic acid taken in a pure state from the laboratory, is employed for the purpose; and in the absence of both, vegetable acids serve the purpose, such as that contained in the *galium verum*, or yellow-lady's bed-straw.

CHELTEMHAM WATERS.—The several mineral springs that occur at Cheltenham, differ from one another in their saline ingredients. The most important of these differences are the presence of iron in some. They all contain chloride of sodium, or sulphate of soda, and nearly all possess some iodine. Some of them contain free carbonic acid.

Cheltenham waters are much used by those who, in hot climates, have contracted liver affection, and also by those, in general, whose digestive organs are in an atonic and weakened state.

CHEMISTRY.—This originally meant the making of gold and silver, or what is now known by the expression alchemy, which means *the chemistry*. According to the modern signification of the term, it is the science that determines the constituents of bodies, and the laws which regulate the combinations and separations of the elementary particles of matter.

CHENOPODIUM QUINOA.—The seeds of this plant are as important to the Peruvians as potatoes or wheat are to us, and it has lately been suggested that it might grow in this country in situations that are at present uncultivated. In Southern Peru, it ripens its seeds 13,000 feet above the level of the sea. Besides being used for making bread and in soups, quinoa seeds are fermented, and are said to make a pleasant beverage.

CHERRY.—There are a great many varieties of this important fruit. Besides being an article of diet in summer and autumn, a liquor is distilled from cherries (*mareschino*), and in many countries they are dried for winter use, and abroad are much used in this state for making soup.

CHICORY.—This is a plant with a fusiform root, which, when sliced, dried, and powdered, is used for mixing with coffee. It is an aromatic bitter, and perfectly wholesome.

CHILBLAIN.—This is a peculiar inflammation of the skin of the extremities caused by cold, parti-

cularly in individuals having a languid circulation. They are best treated by the local application of stimulants, and of these, soap liniment, and oil of rosemary, are perhaps the most useful.

CHILLIS.—See 'Capsicum.'

CHIVES.—These are the stalks of a small species of allium, milder to the taste and smell than onions.

CHLORIFORM.—This compound consists of chlorine, hydrogen, and carbon. It is a heavy colourless liquid, of an agreeable fruity odour, and a pleasant sweet taste. Rapidly breathed, it produces insensibility, and people about to undergo painful operations are now generally placed under its influence.

Not only is the pain in such cases avoided, but, from there being no violent shock given to the nervous system, the chances of recovery are increased. The application of chloriform in this manner was first recommended by Professor Simpson.

CHLORINE.—This is an elementary body, discovered by Scheele in 1774, but the true nature of which was determined by Sir Humphrey Davy. It is a gas of a greenish colour and peculiar odour, a great supporter of combustion, and remarkable for the property that it possesses, of being able to destroy animal and vegetable colours, and also unpleasant odours.

CHOCOLATE.—See 'Cacao.'

CHOLERA, MALIGNANT.—This extraordinary and very fatal disease broke out in India in 1817. In that country it has prevailed ever since, generally prevailing during the hot season. From there it commenced to spread, always advancing in a north-west direction. Thirteen years elapsed ere it reached Europe; but in 1830 it broke out in Moscow, in which place its ravages were frightful. Steadily pursuing its north-western course, in two years later it invaded this country, showing itself at Sunderland in October, 1831, and in the Lothians in January, 1832. From these two points it extended to all the large towns of the empire, and destroyed about twenty thousand of our population. The disease then went farther westward, crossed the Atlantic and invaded America. There have since been two or three small epidemics of cholera in this country, but the disease in them has been much less fatal.

One of the frightful peculiarities of cholera is the rapidity with which it runs its course. It almost invariably breaks out between sunset and sunrise; and the affected person is sometimes dead within four hours, and the attack rarely lasts longer than thirty-six. It is sometimes preceded by a general feeling of uneasiness; but often suddenly attacks a person in perfect health, and without any premonitory warnings. Its symptoms are violent diarrhoea and vomiting, excruciating colic, and extreme depression of the heart's action. This failure of the circulation produces a peculiar leaden

or blue colour of the skin, and a great diminution of animal heat.

Malignant cholera is very little amenable to treatment; one-half, or more, of those attacked perishing. As the fatal event takes place from the failure of the circulation, the rational treatment consists in the administration of stimulants; but, owing to the extreme depression, they are of little avail. On the other hand, bloodletting, and other antiphlogistic remedies, when tried, as they have been, are not so very injurious (although they do increase the mortality) as would, *à priori*, be expected.

CHOREA.—This is the disease popularly known by the name of St. Vitus' dance, and is a non-inflammatory nervous affection, characterized by involuntary muscular contractions. The following is Sydenham's account of its peculiar convulsive movements:—"First, it shows itself by a lameness, or rather instability of one of the legs, which the patient drags after him like a fool. Afterwards, it appears in the hand of the same side, which he that is affected with the disease can by no means keep in the same position for one moment; if it be brought to the breast, or any other part, it will be distorted to another position or place by a convulsion, let the patient do what he can. If a cup of drink be put into his hand, he represents a thousand gestures, like jugglers, before he brings it to his mouth; for, whereas he cannot carry it to his mouth in a right line, his hand being drawn hither and thither by the convulsion, he turns it often about for some time, till at length, happily reaching his lips, he flings it suddenly into his mouth, and drinks it greedily, as if designing to make sport." It extends in very severe cases to the muscles concerned in the voice, and speech becomes difficult. It generally yields to the exhibition of chalybeates.

CHROMIUM.—This is a metal discovered in the year 1797. Some of its compounds are used in the arts, but none are employed in medicine.

CHUB.—This fish occurs abundantly in the sluggish rivers of South Britain. It sometimes, but rarely, attains to a weight of four or even five pounds. Its flesh is wholesome, but is not considered very good, being soft. It should be cooked when very fresh.

CHYLE.—The nutritious part of the digested food.

CHYME.—The food acted upon by the stomach.

CIDER is the fermented juice of apples, and is the common beverage of many districts of the south of England, the north of France, and the United States. To make it, the apples are passed through a press, and fermented by means of the gluten natural to apple juice. In ordinary years, the best cider can be profitably sold at the rate of from a shilling to eighteenpence per gallon, and a



CITRUS BIGARADIA
BITTER ORANGE.

second quality at less than half that rate. In Normandy, a spirit is distilled from cider, and sold as brandy.

Cider would appear to be quite a wholesome beverage. At any rate, it produces no ill effects on the labourers of Herefordshire, who drink it in great quantities. The usual allowance to a farm servant in that locality is three quarts a day, which is raised during harvest to twelve.

CIGAR.—See 'Tobacco.'

CIMBRI.—This is the name given by the ancient writers to the members of one of the tribes of barbarians that invaded Italy. It is not easy to decide as to whether they were Celts or Teutons.

CINCHONA.—This plant and its uses are stated at some length in p. 159, and following.

CINNAMON.—See Chapter V., Part II.

CINNIBAR.—See 'Mercury.'

CIRCULATION.—For a pretty extended account of the circulation of the blood, the reader is referred to Chapter III., Part I.

CITRIC ACID.—This acid is contained in many fruits, but in largest quantities in limes and lemons. See Chapter V., Part II.

CITRUS.—This is the name of a genus of plants, many of which yield valued fruits. Eight different species are enumerated, and these, as well as one or two varieties of the first of them, demand notice.

1. *Citrus Aurantium*, the sweet orange. Of this very common fruit several varieties exist. There are—

a The China orange. This is the common orange of this country, and comes principally from Portugal.

b The blood-red orange. This is distinguished by its pulp being irregularly mottled with crimson. It was formerly thought to be a hybrid between the pomegranate and orange. It is, however, merely a variety of the orange.

c The St. Michael orange. This is characterized by its thin rind, sweet pulp, seedless fruit, and delicious flavour. Great quantities of it are imported from the Azores, where one tree is said sometimes to yield 20,000 marketable oranges.

2. *Citrus bigaradia*, or bitter orange. This is distinguished by the bitterness of its pulp, and is the officinal variety. The Seville orange is an example of this kind. Its rind forms the candied orange peel of the shops; it gives its peculiar flavour to curaçoa, and is employed in bitter infusions. It is figured in Plate XXVI.

3. *Citrus bergamia*, or bergamot orange. The fruit of this is rarely seen in this country; but the rind of it contains the essential oil of bergamot.

4. *Citrus limetta*, or lime. In foliage this resembles the lemon; but the pulp of its fruit differs, in being flat, and slightly bitter to the taste. It is

principally employed in flavouring punch, sherbet, and the like.

5. *Citrus decumana*, or the shaddock.—The fruit of this kind is very large, and its juice is remarkable for its delicate sub-acidity. The shaddock is much cultivated in both the East and West Indies. Smaller samples of it are sold in the shops under the name of Adam's apple, or the forbidden fruit. On the Continent, a variety of the first-mentioned kind—the sweet orange—is sold under the same name.

6. *Citrus lumia*, the sweet lemon.—This is merely a lemon, the juice of which is sweet. Many sorts of it are common in orange countries, but they are almost unknown here.

7. *Citrus limonum*, the true lemon, the fruit of which is the well-known lemon of the shops.

8. *Citrus medica*, the citron.—The fruit of this is very large, and its peel is sold candied in the shops.

CLARET.—This is the name that is given in this country to the wine of Medoc, and also sometimes to any red-coloured wine imported from France.

CLARIFICATION.—This is the process of ridding a liquid of impurities suspended in it. Isinglass or albumen, in some form, are usually employed for the purpose. These descend to the bottom of the cask that contains the turbid liquid, and convey along with them the impurities.

CLAY.—This is a silicate of alumina, generally, but not necessarily, containing a little carbonate of lime.

CLOVES.—These are the dried flower-buds of the *Caryophyllus aromaticus*.

COAL.—This fossil wood is now the common fuel of the greater portions of these islands. When coal fires were first of all introduced, they were regarded as very prejudicial to the health, and there was even some attempt made to put them down by legislative enactments. In like manner, when the gas from coal was first used to illuminate houses, &c., similar declarations of its unwholesomeness were made.

COBALT.—This is a metal, some of the compounds of which are much used in the arts, but not in medicine.

COCCULUS INDICUS.—The very poisonous berries of this plant are said to be occasionally added to malt liquors. If so, this adulteration is a very dangerous one.

COCHINEAL.—This is the dried body of the female of the *Coccus cacti*, a Mexican insect. It is without odour, of a bitter warm taste, and communicates to substances a beautiful crimson colour. It possesses no therapeutical properties, but is often employed to colour medicines. It is the source of carmine and lake.

COCKLE.—This shell-fish is, in general, a wholesome article of food, but, like mussels, it would

sometimes seem to acquire slightly poisonous properties.

COCOS.—This is a species of palms found in all tropical countries, particularly in the vicinity of the sea. It produces the well-known nut, the cocoa-nut. It is a tall tree, with a stem of a fibrous nature, crowned at the top with gigantic leaves. The flowers make their appearance in the wet season every five or six weeks, so that the tree is seldom destitute of both blossoms and nuts, a good one producing upwards of a hundred annually.

The cocoa-nut palm is a very valuable tree to the natives of tropical countries. The roots are chewed in place of areca root; the young buds are much esteemed as a delicious vegetable; the leaves are employed for thatching houses, and also for making clothes, and even books; from the sap a wine is fermented, and from this wine a spirit distilled, and from this sap also is a sugar extracted, called by the Hindoos jagghery; the ripe fruit is a wholesome food, and the fluid, or milk, that it contains, a pleasant beverage in hot weather; the fibrous bark is used for making brushes, &c.; the shell is converted into dishes for the table; and the white solid matter, on pressure, yields an oil extensively used for illumination, and other purposes.

CODEIA.—This is an alkaline found in opium.

COFFEE.—This is a tropical genus of berry-bearing shrubs, one species of which—the *Coffea arabica*—has become celebrated on account of the agreeableness of the infusion of the roasted albumen of its seeds. The kind most in esteem comes from Arabia; that of the West Indian islands is considered next in quality, and that of Ceylon the least valuable.

The action of coffee upon the human system was formerly, and probably correctly, referred to the empyreumatic oil that it contained, and which renders it a stomachic, and a stimulant of the nervous system. A recent conjecture regarding it is, that its use is owing to the action of its peculiar principle, the highly nitrogenous caffeine, upon the liver.

COGNAC.—See 'Brandy.'

COLD.—See 'Catarrh.' For the action of cold as an exciting cause of inflammatory disease, see Chap. III., Part II.

COLIC.—Violent spasmodic action of the intestines. It yields to opium and antispasmodics.

COLOCYNTH.—See 'Cucumis.'

COLON.—The largest of the large intestines.

COLUMBINE.—A metal of little interest.

COMA.—This mode of dying is described in Chapter I., Part II.

COMBUSTION.—See 'Heat.'

COMPLEXION.—See 'Race.'

CONCUSSION.—See 'Head, Injuries of.'

CONGESTION.—This is a preternatural accumulation of blood in the capillaries, attended with dis-

ordered function in the congested part.—See Part II. almost *passim*.

CONIUM MACULATUM is the hemlock, the leaves of which are a powerful sedative.—See p. 163, and Plate XXIV.

CONSTITUTION.—This is the name given to any little peculiarities an individual may have with respect to articles of diet, medicine, causes of disease, and general ability to undergo fatigue, &c.

CONTAGION.—See Chapter III., Part II.

CONVOLVULUS JALAP.—This beautiful Mexican plant, from the roots of which jalap is derived, is figured in Plate XXV. The *Convolvulus scammonia* is a native of Asia Minor. For the properties of both jalap and scammony, see the chapter on the 'Principal Remedies,' Chapter V., Part II.

CONVULSIONS.—Irregular muscular actions are part of the symptoms of various diseases, particularly of epilepsy in adults, and in disordered dentition in children. They also often occur in other disorders affecting the nervous system. The treatment of convulsions depends, of course, upon their cause.

COOKERY.—Civilized man uses a few of his articles of diet in a state unacted upon by heat. These are principally derived from the vegetable kingdom, as fruits and salads. A very few animal matters are eaten raw—oysters and other shell-fish, and, as in Germany, salted ham, being the most common. Modern custom, indeed, revolts at eating food derived from an animal source that has not been acted upon by heat, although in practice a great portion of large joints is, when served up, absolutely raw.

The various modes of applying heat to articles of food, constitutes one great end of the art of cooking. Another is, by adding flavourings to excite an appetite in those who are not inclined to take a sufficient supply of food.

The most important change produced in animal and vegetable substances by the application of heat, are the coagulation of the albumen, and the greater development of the ozmazome. Another result obtained is, that, by the expansion of the water contained amongst the food, the particles are split, and the whole rendered more easy to be separated by the action of the teeth.

One of the common modes of applying heat to meat is by boiling. When, as is often the case in England, the only object is to eat the meat, and when the water in which it is boiled is thrown away, the joint to be boiled should not be put into the water until the water is quite boiling. When this is done, the heat immediately coagulates the albumen at the surface, and, forming an impermeable crust, prevents the escape into the water of any of the nutritious matters of the meat. If, however, the soup to be made is the first or a great consideration, the meat should be put into

the water when it is cold. In this manner, a great part of the albuminous principles of the flesh are gradually extracted.

Boiling, if the water be used as soup or broth, is clearly the most economical mode of cooking, inasmuch as nothing is lost.

In roasting, meat is exposed to the direct rays of a fire, and as far as the cooking is concerned, the meat is properly acted upon. But a good deal of the meat is driven off by evaporation into the air. A great part of this is unquestionably water as contained in the meat, but some portion of the nutritious parts of meat are also doubtless expended during the progress of roasting.

Baking is merely a modification of roasting, and one in which there is, perhaps, rather less waste. Frying is that mode of cooking in which heat is applied through the medium of boiling fat. In it, too, the outside of the skin is charred, and the compounds contained in it probably much decomposed, and a quantity of the fat generally adheres to the meat so cooked, and renders it difficult of digestion.

COPPER.—This is one of the best known of the metals.—See p. 141.

CORIANDE.—The seeds of corianders (which are said to have the same odour as bugs) are carminative. They are used in making confectionary articles and liquors, and are also employed in continental cookery.

CORK.—This is the soft elastic bark of a species of oak inhabiting the Peninsula. It was known to the ancients, who used it as we do for bunging casks, and for soles to the shoes of women. It is now, as every one knows, extensively employed for stopping glass bottles, and also, from its lightness, for floats for fishing nets, swimming belts, &c. It is qualified for stopping bottles by its great compressibility and elasticity, while its pores are so minute that they do not allow liquids to pass through them.

CORNS.—These are at first simply thickened pieces of cuticle, arising from long-continued pressure. They generally occur upon the lower extremities. These, however, in time acquire a base, become strongly attached to the adjacent parts, and often a little bursa, or bag, forms underneath them. They then become firmly established corns, and often inflame and become very painful.

In almost every case, corns are caused by the pressure of shoes that are either too tight, or that are ill-shaped. The radical cure for them is to remove this cause. The palliative consists in diminishing the pressure as much as possible, by removing the thickened cuticle by a knife, or the application of caustic, or by wearing a portion of some kind of plaster, having a hole in its centre as big as the corn. This, of course, takes off the pressure.

If, as sometimes happens, the bursa under an inflamed corn suppurates, it must be treated as an abscess.

CORPULENCE.—This is an excessive accumulation of fat in various parts of the body, and may be said to exist whenever the fat makes up more than one-eighth part of the body. The fat generally accumulates under the muscles, in the omentum and mesentery, about the heart, at the chest, and at the chin, but in extreme cases it is found in other parts also. Along with the excessive deposition of fat, there is generally to be noticed sleepiness, incapacity for active exercise or mental labour, shortness of breath, and a tendency to various congestive diseases, as apoplexy, and the like.

Dr. Radcliffe's prescription for excessive corpulence was, "to keep the eyes open, and the mouth shut," and there is no doubt that the disease very often depends upon inactivity and gluttony. Perhaps, in very extreme cases, a diet composed entirely of albuminous proximate principles would be advantageous.

COSMETICS.—These are substances used for removing freckles, &c., from the face. The patented applications for this purpose sold in the shops are generally dangerous, and usually contain corrosive sublimate.

COTTON.—This is now very extensively employed as a clothing fabric. The popular opinion, that it is injurious to sores, is quite erroneous; and, as before mentioned, it is the best application that we can make to burns.

COUGH.—The violent expulsion of air, often attended with expulsion of mucus, or other matter, from the chest.

COWPOX.—See 'Vaccina.'

CRAB.—This is a species of shell-fish very often used as food. Its flesh is sometimes unwholesome; and, like that of most carrion-feeding animals in general, difficult of digestion. As it is sold in the markets, it is almost always undercooked.

CRAMP.—A partial violent involuntary contraction of a muscle, or set of muscles.

CRANBERRY.—This is the fruit of two species of *Oxycoccus*. The English *Oxycoccus* grows abundantly in Norfolk, Cumberland, and other parts; and the same kind grows so luxuriantly in the north of Russia, that the snow is said to be stained with it. The American *Oxycoccus* is a different species, bearing a larger berry. Besides the cranberries grown at home, large quantities are imported from Russia and the United States, the pleasant austere taste of the berry rendering it in great request for making tarts.

CRAWFISH.—See 'Astacus.'

CREAM.—See 'Butter.'

CREOSOTE is a fluid, composed of oxygen, hydrogen, and carbon, that exists in crude pyroligneous

acid. It coagulates both albumen and serum; and the power that pyroligneous acid possesses, of preserving flesh from putrefaction, is believed to be attributable to these properties of the creosote.

Creosote has been employed in medicine to check vomiting, particularly sea-sickness, and for other purposes, but is not now very much used. It is extensively employed in anatomical museums, and is said to be put into whisky to communicate to that spirit an artificial *peat-reek* flavour.

CRESS.—The name given to various plants having acrid or pungent leaves.

CRETINS.—This is the name given in the Alpine valleys to certain individuals who are more or less idiotic, and who have goitres. The connection between the goitre and the mental infirmity is not clear, many of the sane inhabitants having likewise goitres.

CROCUS SATIVUS.—The plant yielding the saffron.

CROTON CASCARILLA.—This plant yields the cascarilla bark. The bark has a bitter but rather pleasant taste, and an aromatic odour. It is used as a tonic stomachic, both alone and associated with other tonics.

CROTON OIL.—The seeds of the *croton tiglium* were formerly used as a drastic purgative, but now only the oil extracted from them is employed. It produces, even in so small a dose as one drop, very considerable purgative effect, and hence is advantageously administered in comatose diseases, in which the power of swallowing is nearly or entirely lost.

Croton oil, diluted with olive oil, and rubbed twice a day upon the skin, brings out a crop of pustules; and the counter-irritation thereby produced is often very useful, especially in chronic affections of the chest.

CROUP.—This is the name of a specific inflammation of the air-passages in children. It is characterized by the tendency to form a false membrane which lines the affected parts. It may be recognized at once from common inflammation of the throat, or bronchi, by the ringing cough, followed by the crowing inspirations that are peculiar to it. This crow is likened to the sound emitted by the chicken in the pip, or *roup*, as it is called in Scotland—hence the name of the disease.

Croup is an affection that runs its course very rapidly. Perhaps, however, until the arrival of a medical man, no more than a warm bath and an emetic should be ventured upon. Croup does not always bear depletion very well, although some cases are very remarkably relieved by it.

CUCUMBER.—This is a trailing annual, the unripe fruit of which is much used as a salad, and also when pickled. There is a popular but apparently unfounded opinion, that it is difficult of digestion.

CUMIN.—Cumin seeds are the seeds of an Egyptian plant. They are aromatic and bitter; and, although they are still retained in one of the pharmacopœias, are scarcely ever used.

CUPEL.—A chemical vessel.

CUPPING.—See Appendix, Chap. III., on 'Popular Surgery for Emigrants.'

CURAÇOA.—The name of a liquor.

CURCUMA LONGA.—This is the turmeric plant, an inhabitant of the East Indies. It is cultivated on account of its aromatic properties, and enters into the formation of curry-powder.

CURD.—The coagulated casein of milk.

CURRENT.—The fruit of the *Ribes rubrum* and *nigrum*. Currants are extensively used in a fresh state, and when preserved with sugar. The dried currants of the shops are a small kind of grape, imported from Corfu and other Mediterranean islands.

CYANOGEN.—This is a bicarburet of nitrogen, and, combining with some of the chemical elements, forms compounds, some of which are of importance. Thus, with hydrogen, it forms prussic acid, and with iron the well-known pigment called Prussian blue.

CYNANCHE.—The name given to the different kinds of sore throats. The most important are—

Cynanche Tonsillaris.—Common inflamed sore throat. When one or both of the tonsils in this affection go on to suppuration, the affection is called a quinsy. It is generally produced by cold, and often attended by a good deal of fever and pain. Its treatment consists of the common antiphlogistic regimen, and much relief is often experienced from inhaling the vapour of warm water.

Cynanche Trachealis.—Croup.

Cynanche Maligna.—Malignant scarlet fever—(which see).

CYPRINUS.—See 'Carp.'

DAMSON.—This is a kind of plum cultivated on account of its hardness, and its agreeable fruit. Dried damsons are sold in the shops as prunes. The pulp of these is officinal, and enters into the composition of the senna electuary of the pharmacopœia.

DANDELION.—This is a corruption of the French words *dent de lion*. It is a very common weed. Its leaves are sometimes used as salads in spring; its root is sometimes employed to adulterate coffee, and is often administered in hepatic and other visceral diseases.

DANDRIF.—A slight scurf on the heads of children.

DAPHNE MEZERION.—See 'Mezerion.'

DATE.—The dried fruit of a species of palm.

DATURA STRAMONIUM.—See 'Stramonium.'

DEADLY NIGHTSHADE.—See 'Atropa,' Pl. XXIII., Fig. 1.

DEAF-AND-DUMB.—The extent to which this malady, or rather imperfection, extends, is very imperfectly known. In Great Britain there are considerably more than twelve thousand deaf males, or more than one in every sixteen hundred inhabitants. In other countries they are more numerous still; and in Switzerland, nearly one in every five hundred is unable to hear and to articulate.

In dumb mutes the organs of speech are usually quite well formed, and the muteness depends altogether upon the deafness. Those so affected never having heard sounds, or if they have, at a very early period of their lives, are not able to imitate them. Sometimes, indeed, when the deafness comes on at a mature age, the power of distinct speech is gradually lost. An officer at Waterloo, for example, had his auditory organs permanently injured and destroyed by the bursting, it was thought, of a shell, and his speech gradually became thicker and more inarticulate, until, at length, he became unintelligible.

Congenital deafness is certainly hereditary, and many members of the same family are often affected by it. Indeed, out of twenty families, members of which were deaf mutes, there were, in all, a hundred and fifty-nine children, and of these no fewer than ninety were thus deprived of the power of hearing sound.

Deaf-and-dumbness would seem to have some connection with cretinism, and in some of the Alpine valleys, before noticed, actually one in a hundred are mute.

Until modern times, the deaf-and-dumb were regarded as incapable of receiving any instruction. The Justinian code held them incapable of making a will, manumitting a slave; and imposed upon them other civil disabilities. Some of the earlier Christians regarded them as incapable of receiving religious instruction; and, indeed, until the fifteenth century, philosophers, legislators, and parents treated deaf-and-dumb people as mere animals; sometimes, it is to be feared, put them to death, and generally kept them out of sight, merely supplying their animal wants.

It was Agricola (born in 1442) who first maintained the possibility of instructing mutes, and he declared that he was acquainted with a person so affected who had learned to write. A Spaniard of the name of Ponce was the first who began systematically to instruct them; and he appears to have done so with considerable success. Subsequently the finger alphabet was invented, perhaps by Dalgarno; but it was De l'Epee who was first successful, on a large scale, in giving complete instruction to these interesting objects of sympathy. Since his time, numerous institutions for their education have been founded, and all of these have been attended with remarkable success. The results obtained in them seem to have estab-

lished that the deaf-and-dumb are naturally equal to other people in their intellects, and that their intellects may, by proper management, be successfully developed. Unfortunately the deaf-and-dumb asylums or schools in this country, are not large enough to hold anything like the number of deaf-and-dumb children; and it is to be lamented that our laws do not possess a decree like that of the King of Denmark's: "Every deaf-and-dumb child born in this kingdom shall receive the education necessary to render him a useful member of society."

DEATH.—See Chap. I., Part I.

DEATH-WATCH.—People sitting up in the still of the night, as those attending upon sick people, often hear a frequently repeated *tick, tick*, which has long been believed by the superstitious to be a supernatural sound, prophetic of death, and hence called the death-watch.

The sound, which in the dead of the night is ominous enough, is in reality produced by a small beetle, the *Anobium Tesselatum*. It is a call to those of its own species; and the animal that issues it, if not answered soon, removes to another place. It is produced by the insect striking its head against the cupboard, or where it may happen to be, and is generally repeated nine or ten times in succession. It may be imitated by striking gently with the nail upon a hard table, and this sound often deceives the beetle, and causes him to knock in reply.

DECOCTION.—A decoction is made by boiling a vegetable substance or substances in water for some time. By this means, in many cases, the whole of the soluble constituents of the plant are extracted from it. Sometimes, however, the long-continued boiling, as is the case when aromatic or volatile principles are present, dissipates a portion of the vegetable employed. Some vegetable principles, too, as tannic acid, are affected by heat long applied.

DECOMPOSITION.—When any compound body undergoes a change in the relation of the elements composing it, either by art or nature, it is said to be decomposed.

DECREPITATION.—This is the name given to the series of slight explosions which many substances (as common salt) undergo when exposed to heat. It is owing to the water that they contain being expanded into steam, and thereby splitting their substance.

DECUSSATION.—The crossing of nerves or muscular fibres.

DEFLAGRATION.—The explosion that attends the burning of certain substances.

DELIQUESCENCE.—This term is applied to the change of form that certain substances undergo, owing to their absorbing watery vapour from the atmosphere.

DELIRIUM TREMENS.—An affliction of the nervous system, induced by taking alcoholic drinks or opium in excess, and characterized by delirium and debility with excitement. Its treatment consists in the exhibition of laudanum and stimulants.

DELPHINIUM STAPHISAGRIA.—The seeds of this plant are used for killing vermin. They have also been applied in skin diseases, but their employment is not altogether free from danger.

DEMULCENTS.—These are medicinal agents which come into contact with surfaces, and protect them from the action of irritant matter. Jujubes, for example, act in this manner in cough excited by irritating secretions from the bronchi.

DENTIFRICE.—A great many substances are used as tooth powders. Perhaps the best consist of animal charcoal and myrrh.

DENTITION.—See 'Teething.'

DESICCATION.—This is the chemical operation of drying substances.

DESQUAMATION.—The falling off of the cuticle in scales, as happens after scarlet fever and other diseases.

DETONATION.—The term applied to substances that explode with a loud noise.

DIABETES.—The pathology of this extraordinary disease is very imperfectly understood. It would appear to essentially consist in a perversion of the function of assimilation, in which all the saccharine and oleaginous articles of food are converted into sugar, which is discharged as an excretion by the kidneys. When the disease, however, is formed in the constitution, the different tissues of the system are absorbed, and their carbon, oxygen, and hydrogen also converted into sugar and excreted. In this manner, the body is very much emaciated, and death, in the same manner as in cases of starvation, comes on.

With regard to the exciting or predisposing causes of the disease, very little is known. Sometimes it would appear to be decidedly hereditary; but, in the great majority of cases, no cause whatever can be specifically assigned.

Unfortunately, treatment is of little avail; and every case of diabetes that occurs, ultimately proves fatal. The administration of opium, and putting the patient upon a diet entirely derived from animals, certainly, in many cases, retard the fatal event. The former was first recommended, because it was supposed likely to check the excretion at the kidneys, which is merely a symptom of the disease, but its action probably depends upon its retarding the action of assimilation. Animal food is indicated, because albuminous proximate principles, of which it mainly consists, are less readily convertible into sugar than the saccharine proximate principles of vegetables. Such a diet, however, is so nauseous, that it can seldom be long persevered in.

Owing to the rapidity with which absorption goes on during confirmed diabetes, there is generally excessive hunger and thirst. The latter is often particularly oppressive, and it should be relieved by drinks that have little tendency to pass into sugar, and of these, perhaps, lime-water, and the very pure water of the Bath wells, are as good as any.

DIAPHORETICS.—This class of medicines are often called sudorifics. They have the power of producing increased excretion from the skin, and hence they have an antiphlogistic and derivative action. Perhaps, also, they have the power of assisting in the removal of excrementitious matter from the system.

As most of the drugs that possess diaphoretic properties are stimulants to the circulation, they cannot be employed in acute inflammatory attacks, and they are principally useful in chronic affections of the skin, and in dropsies, particularly in those dependent upon renal disease.

DIAPHRAGM.—This is the name of the muscle that divides the abdominal from the thoracic cavity. Its popular name is the midriff. It is one of those muscles that perform their contractions in deference to impressions conveyed to the nervous centres, and not in obedience to volitions. It is, as explained in the chapter on 'Respiration,' one of the main moving powers that control the admission and discharge of gaseous matters from the lungs, and it is also principally concerned in the abnormal acts of vomiting and hiccup, and in the occasional occurring natural movements that produce laughing, weeping, crying, coughing, and yawning.

DIASTOLE.—The action of the heart when its cavities expand to receive the blood. It is the opposite of *systole*, which signifies the action of the cavities of the heart that expels the contents.

DIATHESIS.—This is merely the name given to any decided state of the constitution. Thus we speak of the rheumatic diathesis, the scrofulous diathesis, and so forth.

DIET.—This important subject will be found to be considered at length in various parts of the body of the work. Here, however, we offer a summary of our knowledge upon this important subject.

Every part of the human frame is daily wasting, and, to compensate for this waste, a constant supply of aliment must be taken from without. From this aliment, the various textures and secretions of the human body must be kept in a state of integrity. As considered in the body of the work, these textures and secretions of the human body are exactly analogous to those of animals and many plants. Man, then, has only to receive into his stomach portions of such, in order to add fresh materials to those portions of his frame that are wasting and

disappearing. The diet of man is, therefore, composed of an aggregation of the different saccharine, oleaginous, and albuminous proximate principles of animals and edible plants—an account of the more important of which is contained under their several heads.

DIGESTION.—This signifies the process during which the different alimentary principles referred to in the preceding article are received into the human economy, and poured into the blood in a state so that they can be assimilated with that fluid.

Articles of food taken into the mouth are minutely divided by the action of the teeth, and reduced to a fine pulp by their intimate mixture with saliva. They are then, by a combination of muscular movements, under the control of the will, thrown into the œsophagus. They now fall under the control of the involuntary actions, and, without the consciousness of the individual into whose structure they have entered, they are carried on, by successive contractions of portions of the diaphragm, into the stomach. Here, in the course of from two to five hours, they are mixed with, and acted upon, by certain secretions of this viscera, the result of which is, that their elements are so arranged and combined together, as to form a greyish homogeneous pulp, to which the name of chyme is given.

This chyme passes on into the intestines, when it gradually separates into the non-nutritious matter of the food, and a creamy substance called the chyle, that contains the whole of the nutrient matter. This is gradually taken away by lacteal vessels, that ultimately, as explained in the body of the work, empty their contents into a large bloodvessel leading to the heart. In this manner does the food keep up the waste of the blood, and enable it, during health, to maintain the integrity of the tissues of the body.

DIGITALIS PURPUREA.—This is the common foxglove—(which see.)

DILL.—This is the *Anethum graveolens*, an umbelliferous plant, the seeds of which are aromatic and carminative. The distilled water obtained from them is pretty often used as a vehicle for other medicines in the case of children.

DILUENTS.—These are watery or demulcent drinks, the effect of which upon the stomach, &c., or the blood, must be mechanical, and attributable to the fluid that they contain.

DIOSCOREA.—This is the name of the genus of plants that produces the tropical tubers called yams, that are very much used as an article of diet in tropical countries, and sometimes brought to Britain. There are several species of the tree, and the tubers of most of them are wholesome and nutritious; but it is proper to know that there are two—the *D. dæmona* and the *D. triphylla*, both

having ternate leaves—which produce very poisonous tubers.

DIOSMA CRENATA.—This is a rutaceous plant inhabiting the Cape of Good Hope, the leaves of which have been long employed by the Hottentots as a remedy in cases of rheumatism, &c. They are now introduced (but not much used) in European practice.

DISCUSS.—This is an old-fashioned word, formerly employed to indicate a series of changes supposed to be induced in abscesses, by means of which suppuration was prevented. There are not any actual *discutients*, although antiphlogistic remedies are often doubtless indirectly such.

DISLOCATIONS.—When the articulated end of a bone is found out of its proper place, it is said to be dislocated, and the restoring it to its proper position is called reducing it. The mode of reduction varies in each different dislocation, and is fully stated in the Appendix on ‘Popular Surgery for Emigrants.’

DISSECTION.—This is the art of separating the different parts of animals and plants in such a manner as to display their structures.

DISTENSION.—This is the term used to indicate the stretching of an organ or part beyond its natural size.

DISTILLATION is the chemical process by which alcohol, or spirit, is separated from the greater part of the water, &c., of wine, beer, and analogous fermented drinks. A similar process, too, separates volatile oils from the greater portion of the infusion, or the like, with which they are mixed. Indeed, this latter mode of distillation is by far the more ancient practice of the two, and was known to the ancients, while the separation of alcohol was only first effected in the thirteenth century. Most extravagant notions were entertained regarding the nature of spirit, and it was called by the alchemists the *aqua vita*. The etymology of *alcohol*, which word has also been handed down to us by the alchemists, and adopted by us, is quite uncertain. It means literally antimony, used as an application to the eyes.

Distillation depends upon the simple fact, that alcohol (or volatile oil, as the case may be) volatilizes at a lower temperature than water or the other compounds with which it is associated. By applying this amount of heat to wine, &c., the alcohol passes off in vapour, and this vapour, when separated, is immediately reconverted into fluid by the application of cold.

DISTORTION.—Two kinds of deformity exist—one congenital, and the other produced after birth by some disorder of the muscles, nerves, or bones. The latter is called distortion.

One of the simplest cases of distortion is squinting. This is produced by a permanent contraction of one of the muscles that move the ball of the eye,

and may generally be cured by cutting the muscle across. Many cases of club-foot, too, come on just in the same manner, and are owing to permanent contraction of some of the muscles about the foot; and when this is the cause, they can be cured by cutting the contracted muscle across. The drawn mouth is produced by an affection of the nervous system, and is generally caused by some disorder of the brain, partially paralyzing the nerves of motion in the muscles of one side of the face.

A very common cause of distortion is rickets, in which affection the bones, not containing sufficient earthy matter to give them due solidity, yield to pressure. One of the slightest forms of this kind of distortion is called bandy-leggedness, in which the bones of the leg bend a little under the weight of the body. Delicate young women are liable to get their spines twisted to one side, principally, it is believed, owing to a bad habit of resting the principal weight of the body on one side, which is generally the right one.

Distortions also are frequently induced by burns, accidents, and the like.

DOCTOR.—One who has taken the highest University degree in either Medicine, Divinity, or Law. The rank has existed since the twelfth century.

DOGMATIC MEDICINE.—This is one of the names of regular orthodox medicines, in which reasoning is employed as distinguished from empiricism.

DOG ROSE.—This is the *Rosa Canina* of botanists. A conserve is made of its fruit, or hips, which, as it possesses no medicinal properties of its own, is very extensively employed to form the basis of pills. It is also of a very proper consistence for this purpose.

DOVER'S POWDER.—The proper name of this is compound ipecacuanha powder. Every ten grains of it contain one of opium, one of ipecacuanha, and eight of sulphate of potash, the action of the latter being mechanical, dividing, more minutely, the other two substances.

Dover's Powder is one of the most powerful sudorifics that we possess, and is much used in chronic rheumatism, &c., as such.

DRACHM.—Three scruples, or the eighth part of an ounce.

DREAMS.—Sleep is but a very partial state of insensibility to external impressions. Indeed, as has been mentioned in the body of the work, almost constant respiration is essential to the continuance of life, and every act of inspiration depends upon a sensation being felt in the breast, and transmitted to the brain. The transmission of this sensation to the brain, and the movements in the voluntary muscles thereby induced, clearly indicate that, during even the most profound slumber, there is a degree of consciousness of external impressions.

If the slumber be less profound, external objects exert a greater influence upon the mind, and various ideas, and trains of ideas, are excited in the sleeping man; but owing to the imperfect control that he has over his intellectual faculties, these ideas, and succession of ideas, are imperfectly connected, vague, and often absurd.

"Dreams are the interludes which fancy makes;
When monarch Reason sleeps, this mimic wakes,
Compounds a medley of disjointed things,
A court of cobblers, or a mob of kings."—*Dryden*.

In the great majority of cases of dreaming, the whole train of ideas, although often pretty complex, are excited by some slight external sensation. There is, for example, Dr. Gregory's dream, as narrated by himself. He went to bed with a bottle of hot water at his feet, and fell asleep, and he began to dream of visiting the crater of Etna, and felt how hot the ground was to his feet. Another time he had been suffering from tooth-ache, and had probably thought of having had the tooth extracted. In his sleep, he dreamed this had been done; and he further dreamed that the drawn tooth turned out to be the wrong one.

Another very remarkable dream, or rather two remarkable dreams, is also narrated by Dr. Gregory. It was at the time when almost every one in Edinburgh apprehended a French invasion. There lived in that city a gentleman who was a very zealous volunteer. This person was sleeping in his bed about two or three o'clock one morning, when he dreamed that he heard the signal-gun fire, that was to announce the alarm. He proceeded in his dream at once to the Castle, witnessed the other signals made, and beheld the marching of troops and artillery-men in Princes Street. He was roused by his wife, who woke in a great fright from a precisely similar dream of an invasion. The next morning it was found that the exciting cause of both dreams, had been the falling of a pair of tongs in the room above.

DROPSY.—This is a symptom of a disease, and not a disease in itself. In the cellular tissue underneath the skin, at the serous membranes, &c., there is continual exhalation of fluid from the blood going on, and also continual absorption. When these two powers are in a healthy state, they exactly balance one another; but if the exhalation become excessive, or the absorption abound, there is necessarily an accumulation of fluid. This accumulated fluid is said to form a dropsy.

The general treatment of dropsy consists in endeavouring to remove the cause, which will generally be found to be some disease of the heart, the liver, or the kidneys.

Still it is very common to attempt to get rid of the fluid by increasing the absorption, which is done by giving diuretics and diaphoretics; and doing so is unquestionably often beneficial, although the

principal treatment should be directed to the cause of the affection.

DROWNING.—The remedies proper to be tried to a person who, having fallen into the water, is taken out of it in a state of insensibility, are as follow:—The body should have the wet clothes stripped off as quickly as possible, be very well dried, and surrounded by an atmosphere of hot air, either by means of the hot-air bath, or by being put into a bed surrounded by hot blankets. Artificial inspiration may be tried, by blowing into the lungs, and then driving out the air from these organs by gentle compression.

If any signs of life appear, a bottle of salts may be held for a second to the nose, and a little cold water dashed upon the face, to excite to acts of natural inspiration; and if the inspirations become stronger, and the person appear able to swallow, a little wine, or spirits and water, should be given.

DUODENUM.—This is the name of the first of the small intestines. It is in immediate connection with the stomach. It is in it that the chyme and chyle separate.

DURA MATER.—A membrane of the brain.

DYSENTERY.—This inflammatory affection of the bowels is sometimes very prevalent and fatal among Europeans in hot climates. In this country it is usually a mild affection, and generally yields to a dose of croton oil and an opium pill.

DYSPEPSIA is the difficult, the imperfect, or the painful conversion of the food into chyme. It is a functional, and not an organic disease; seldom dangerous, but productive of a great deal of suffering to those affected with it.

It is mainly prevalent among those whose minds are more occupied than their bodies, whose mental energies are overtaxed, and who are suffering from harassing or depressing emotions. The plan of treatment is to avoid the causes; and this is a prescription which, unfortunately, may seldom be obeyed.

Attention, however, to exercise and to diet may often very much alleviate the affection. When one of the prominent symptoms is want of appetite, tonics are indicated; and when, as is very often the case, acidity and flatulence are the most distressing symptoms, antacids and carminatives.

DYSŒNŒA.—Difficulty of breathing.

EARACHE.—This is the name given to a painful and inflammatory affection of the lining membrane of the ear, that often occurs in children. It is best relieved by warm poultices. The various parts of the ear of the adult are also liable to attacks of common inflammation, but such do not call for any particular notice.

EAR, SORE.—Children, particularly those of a scrofulous diathesis, are liable to have the external ear, and the scalp behind it, in a state of chronic inflammation. The only treatment that these sore

ears require, is cleanliness. Indeed, sometimes they appear to have a beneficial counter-irritant action.

EARTH-NUTS.—The name applied to the edible subterranean tubercles of many plants.

EAU DE COLOGNE.—This is much used, both as a perfume and as a restorative, in cases of fainting. It is also an excellent evaporating lotion in cases of nervous headache. The following is said to be the recipe followed in the Cologne manufactories:—

Oil of Neroli,* 12 drops.
Oil of Citron, do.
Oil of Bergamot, do.
Oil of Orange, do.
Oil of Rosemary, do.
Malabar Cardamoms, 1 drachm.
Rectified Spirit, 20 ounces.

These are mixed together, and allowed to stand for a little time. It should then be distilled, but this is not absolutely necessary.

EAU DE LUCE.—This is an old-fashioned preparation, formerly much employed, dropped in water, or applied to the nostrils in cases of fainting, and in hysterical fits. It is a solution of mastic, oil of lavender, oil of amber, and ammonia, in spirit.

EAU MEDICINALE D'HUSSON.—This is a vinous tincture of colchicum, recommended to gouty patients. In the hands of a non-professional person, it is dangerous.

ECZEMA.—This is a skin disease, characterized by an eruption of small vessels, and usually dependent upon a morbid condition of the digestive organs.

EFFERVESCENCE.—This is the name given to the escape, with violence, of a gas from a liquid.

EFFERVESCING DRAUGHTS consist in water from which carbonic acid gas is being rapidly discharged, and are always formed by mixing the solution of a carbonate of an alkali with some acid. The water also contains the neutral salt formed by the union of the acid and the alkali. They are sometimes very useful in cases of irritability of the stomach. The most agreeable of them is made by mixing bicarbonate of potash and lemon juice.

EFFLORESCENCE.—This is the property by which certain salts lose their water of crystallization, and become opaque, and sometimes their crystalline form assumes a powdery appearance.

EGG.—An egg contains a large quantity of albuminous proximate principles in a form easy of digestion.

EGG PLANT.—The fruit of the egg plant is a favourite article of food in many countries; but either the variety grown in this country has a peculiar bitter taste, or the mode of cooking it is not understood here. In China, this fruit is cooked on the plant, and in that way brought to table.

* This is the essential oil of orange flowers.

ELATERIUM.—This is the dried juice of a species of wild cucumber, the *Momordica elaterium*. It is a very powerful cathartic, acting in very small doses; but is, in modern practice, almost superseded by croton oil.

ELECTRICITY.—It has often been supposed that electricity was analogous in its nature to nervous influence, and hence its use has been recommended in those cases in which, as in chronic paralysis, the nervous influence is clearly defective. Also, as has been stated in the body of the work, many are of opinion that the nervous system presides over secretions and excretions, and hence the application of electricity has been suggested in many cases of vitiated secretions.

These recommendations of the use of electricity are clearly quite hypothetical. The excretions take place from the blood quite independently of any nervous influence, and there is no proof, and, indeed, no probability that electricity and nervous influence are the same, or even analogous. Farther, the application of electricity has fallen pretty much into the hands of empirics, and no reliance can be placed upon their reported cases. The result of all this is, that we are very ignorant what effect the moderate application of electricity has as a therapeutical agent. Upon the whole, it may be decided that, in the present state of our knowledge, we are not acquainted with any particularly useful properties of this nature that it possesses.

ELECTUARY.—This is the name given to a compound of various medicinal substances, united by means of a syrup or wine into the consistence of honey, and differing from a confection in being less solid. The advantage of electuaries over many other forms of administering medicine, consists in the natural taste of their ingredients being, if properly made, almost entirely concealed. Notwithstanding this, and it is sometimes of importance, electuaries are almost entirely gone out of fashion—only a few of them retaining their place in the pharmacopœias, and these being very seldom prescribed.

ELEMENT.—In chemistry, a substance is regarded as elementary, when it cannot be separated into two or more substances. The elements which, by their various unions, compose the structure of man, are carbon, nitrogen, oxygen, sulphur, phosphorus, chlorine, sodium, potassium, calcium, and iron.

ELEMI.—A resin, of which there are two kinds. The one comes from the West Indies, and the other from the East. They are both secreted by various species of *Amyris*. Elemi is a yellowish-coloured substance, of a pleasant odour, that is increased by the application of heat. It is sometimes used to form an ointment, but is mainly employed in the composition of fumigating pastiles.

ELEPHANTIASIS.—The elephant disease (which this word indicates) is applied to two different affections.

The one of these consists of a chronic inflammation, and consequent swelling of the leg, particularly of the skin of the leg, which render this member somewhat like the leg of an elephant. It is common in Barbadoes, and is sometimes seen in its chronic form in this country. In this chronic form, however, it does not appear to be amenable to treatment.

The other is a much more terrible malady, but altogether confined to hot countries, particularly to those in which agriculture and the other arts of civilization are in a backward state. In it the skin becomes covered with tubercles, and these run their course during a long period, and at length produce (at least, if the accounts are not exaggerated) fearful deformities. The tubercles at last ulcerate and produce sloughing of the nose, frightful ulcers of the face and other parts of the surface, and at length the toes and fingers mortify.

The ancient leprosy, probably, was a somewhat similar complaint.

ELUTRIATION.—This is the name given to the process of separating two different powders, having different specific gravities, by suspending them in water. It is also used for separating the finer kind of the same powder from coarser particles with which it may be mixed.

EMACIATION, or Wasting, is produced whenever the absorption that constantly goes on is not compensated by a due amount of deposition from the secreting organs. Hence it is common in almost all chronic diseases, particularly in those of the organs of assimilation. It is, of course, no disease in itself, but a symptom of disease.

EMBALMING.—See 'Mummy.'

EMBROCATIO.—This word is derived from *ἐμβρίχω*, to rub in, and implies an external application that is well rubbed into the skin.

EMETICS.—These are medicines that possess the property of compelling the stomach to drive its contents into the mouth.

Emetics are useful in expelling poisons or unwholesome food from the stomach, and they have, perhaps, the power of expelling from the system the poisonous matter of contagious fever. And certainly, when administered in the commencement of most febrile diseases, the attack seems to be rendered less virulent by their action. They have also for long been considered to possess a specific action in chronic hooping-cough.

Two classes of emetics exist—one, comprising those, such as sulphate of zinc, which produce their action without causing much nausea; and the other, comprehending those that excite a good deal of that unpleasant feeling, as ipecacuanha, or tartar emetic. Those of the former class generally excite the action of vomiting much sooner than those of the latter, and hence are more suited for cases of poisoning; but the nauseating effects of the latter

probably assist their action at the commencement of fever, and in such instances they should be preferred.

EMOLLIENTS.—These are remedies that relax and soften the parts to which they are applied. The most important of them is heat combined with moisture.

EMPHYSEMA.—This expression denotes two very different affections. It is sometimes applied to an enlarged condition of the air-vesicles of the lungs, generally produced by violent coughing, during fits of bronchitis, &c. It is also used to indicate the blowing up of the cellular tissue under the skin by air. This sometimes happens from various causes; but the most common is, as in cases of fractured rib, when a point of the bone penetrates the lung. In such an occurrence, every time the hurt man breathes, the air he inspires passes through the wound into the cellular tissue, which very soon becomes much distended.

This latter kind of emphysema is of very little consequence in itself, and will generally disappear spontaneously, when the cause is removed.

EMPIRICS.—This expression is derived from a Greek word, and signifies a man who derives his knowledge from the observation of facts solely, and not from any reasoning, or general principles, deduced from this isolated observation. The name was first bestowed upon a medical sect that took its origin in the Alexandrian school, and the members of which taught, in opposition to the Dogmatists, or followers of Hippocrates, that all reasoning should be banished from medicine, that it should be reduced to an art, and made to consist in repetitions of what any one had chanced to observe to be useful.

The name, in modern times, is often applied to ignorant and irregular practitioners.

EMPYEMA.—This signifies a collection of pus between the lungs and inside of the thorax.

EMPYREUMA.—When many animal or vegetable substances are exposed to much heat, the elements that compose them often form new combinations, having a strong smell. This is the empyreuma.

EMULSION.—This is the name given to a fluid mixture, having generally a milky appearance. Emulsions are sometimes partial solutions, and at others only suspensions of resinous or oily substances, but much more frequently the latter. The most important of the emulsions of the pharmacopœia are those of almonds, gum-arabic, and camphor, which may be converted into emulsions by the action of an alkali, and those of resin by the yolk of an egg.

ENAMEL.—See 'Teeth.'

ENDEMIC.—An endemic disease is one that is peculiar to a particular country or district. Ague, for instance, is endemic in all marshy countries, bronchocele in Derbyshire, &c., cretinism in Alpine valleys, plica in Poland, &c.

The expression is used in contradistinction to epidemics (which see), and is pretty analogous, as far as regards the diseases of a country, to *indigenous* among plants.

ENDERMIC.—This word means the action of medicines absorbed by the true skin.

ENDIVE.—This is a Chinese plant that was introduced into our gardens about the beginning of the seventeenth century. It is one of the few winter salads that we can have in this country. Unless blanched, it is disposed to become unpleasantly bitter.

ENDOGENS.—One of the great natural divisions of plants is so named from the new wood of its members being always developed in the interior of the trunk. The trunk of such trees has no distinction of bark, wood, or pith, and no medullary rays. The leaves have the veins, or nerves, parallel to one another, and the seed is always invested in one cotyledon only.

Many dietetical and medicinal plants belong to this division. We may enumerate all the corn plants among the former, and aloes and squills among the latter.

ENTERITIS.—This is inflammation of the intestines. In practice it is not easy to distinguish this affection from inflammation of the peritoneum.—See 'Peritonitis.'

ENTOZOA.—This is the name given to that class of parasites that live in the body. They are occasionally found in the digestive organs, the muscles, the eye, &c.

EPHEMERA.—This is the name given to a febrile attack that lasts only a day, or, at any rate, for a very short period. Such sometimes occur in children, or very delicate adults, generally from some disordered state of the organs of assimilation.

EPIDEMICS.—An epidemic disease is one that suddenly breaks out in a country, prevails amongst a large portion of its inhabitants, and after a time disappears, or nearly disappears. The most decided epidemics have perhaps been the visitations of plague and cholera, and also perhaps the influenza; but many other diseases occasionally become epidemic—as, for example, fever, small-pox, measles, scarlet fever, and the rose.

These last-mentioned, however, never entirely disappear from a community, but occasional cases of them occur; but when the epidemic of any of them attacks a country, the number of the cases become most remarkably increased.

It must be remembered, that an epidemic disease always essentially depends upon a widely-extended but temporary cause, and that any disease, however extensively it prevail, is, if its cause be of a persistent nature, an endemic.

EPIDERMIS.—The outer or scarf skin. See 'Skin.'

EPIGLOTTIS.—This is a cartilage of an oval form, that lies over and covers the glottis or opening of the larynx, and protects it from the ingress of foreign bodies. During the action of swallowing, in particular, it completely shields it.

EPILEPSY.—Literally means a "seizing," and is synonymous with "morbus divinus," and the "falling sickness." It is essentially characterized by sudden loss of power and consciousness, and violent convulsions of the muscles. These are succeeded by a state of stupor, which also in its turn passes away.

Very commonly, before the attack, what is called the epileptic *aura* is felt. This consists in a sensation of coldness, as if a current of cool air were moving from some part of the body, generally along the limbs towards the head. Sometimes it is a sensation of a stream of water, but always of something moving towards the head. When it has arrived there, the fit begins.

The commencement of the attack is usually indicated by a loud cry or scream, and then the affected man drops to the ground in a state of violent convulsion. This cry is uttered in about three of every four cases. Occasionally a few seconds elapse before the epileptic falls to the ground, and a few short jumps are made, that have been named by an old writer *epilepsia saltator*. Immediately on falling to the ground, consciousness is suspended, and in a violent paroxysm the following symptoms are seen.

The head is thrown backwards; the eyes are open and staring, the pupils being dilated and insensible to light; the countenance is dusky and flushed, and the muscles of the face in a state of violent convulsion; the tongue is thrust out of the mouth, and, as it is almost always bitten, bleeds, and this blood tinges the saliva that flows in considerable quantities from the mouth; the arms are tossed wildly about, and the hands keep opening and shutting. The muscles of the trunk are so violently convulsed, that they have been known to fracture bones. The breathing is oppressed, and often accompanied by moaning. This state lasts for a minute or two, sometimes much longer, and the patient gradually acquires consciousness, but there is, for a considerable time, a degree of languor and depression.

The fits come on in different individuals at very varying intervals. Sometimes years intervene between two, and in other instances they occur every day.

Epilepsy is more a symptom of some strong irritation existing in the nervous system, than a disease in itself. It is witnessed in many instances in which parts of the nervous system have their structure altered and morbid, and it is often excited by accidental irritations of the mucous membrane lining the digestive organs, as by dentition

in children, or the presence of entozoa; but idiopathic epilepsy often comes on unconnected with any known morbid state of the nervous system, and without any visible irritation. In such cases it is very often hereditary.

Whenever an epileptic fit comes on, the neck-cloth of the sufferer should be removed, and his shirt and waistcoat unbuttoned. The head and shoulders should be supported, and a small piece of wood should be carefully held between the teeth, in order to save the tongue. If placed on a bed, due care should be taken, lest, in his convulsions, the sufferer fall. Perhaps, although it is very doubtful, putting a piece of cold metal to the nape of the neck shortens the paroxysm. Beyond following these directions, nothing more should be done, and various applications that have been recommended, are very dangerous.

Epilepsy is one of the diseases that is very often feigned by street impostors. They imitate the convulsions as well as they can, and produce the froth by previously concealing a piece of soap in their mouth. However skilfully the imposition is managed, it may be immediately detected by suddenly raising the eyelid, and taking care that a strong light be suddenly cast upon the eye. If the case be one of true epilepsy, the pupil will not contract; but if feigned, its contraction will be very visible. Indeed, a simpler test is often sufficient. In a severe fit of epilepsy, the tongue is almost certain to be bitten, and the saliva rendered bloody, while an impostor seldom ventures upon the painful experiment of biting his tongue.

There is a mild form of epilepsy witnessed in people of a nervous temperament, and excited by slight irritations made upon the nervous system. This affection has received no name in our language, but is called by the French *le petit mal*. It is characterized by fits of insensibility, attended or not by slight convulsions. It often arises from very small causes, and is frequently merely a hysteric affection.

The curative treatment of epilepsy is very difficult. If the cause of it can be discovered, that, of course, is to be removed; but, in general, all that can be done, is to attempt to improve the general health, and to make the patient avoid everything that can excite the nervous system. Various drugs, thought to be tonics to the nervous system, as oxide of zinc, lunar caustic, &c., are often prescribed in this affection. The latter, unfortunately, if continued for some time, stains the skin with a blue colour that is permanent.

EPISPASTICS.—This is an old-fashioned name for blistering ointments.

EPITAXIS.—Bleeding from the nose. See 'Nose.'

EPSOM SALTS.—A mineral spring at Epsom contains a considerable quantity of sulphate of mag-

nesia; and hence, in common language, this saline purgative, although derived from other sources than the spring at Epsom, is called Epsom salts.

Epsom salts, of all the saline purgatives, is the one now usually administered, and it has entirely superseded the use of Glauber's salts. It is sometimes given in water, sometimes in infusion of senna; but its taste is best concealed either by strong mint-water, or a few drops of dilute sulphuric acid.

ERGOT.—This is a name that is bestowed upon a small fungoid growth that occurs on several of the cultivated cereals, but which has been most frequently observed upon the rye. The excrescence that it produces resembles a spur, and hence the affected corn is commonly termed spurred rye.

The ergot of rye varies in length from a few lines to a couple of inches, and is from two to four lines in breadth. In colour it is of a bluish black externally, and of a grey hue within.

Bread made of diseased rye (and rye, although little grown in Britain, is, it must be remembered, the staple corn of many parts of the continent) has a most extraordinary and poisonous effect upon those who consume it habitually. The extremities have a strong tendency to assume a peculiar kind of inflammation, of which the principal phenomenon is dry sloughing. In this manner the toes and fingers, and even the hands and feet, sometimes mortify, and are separated from the body.

ERRHINES.—These are a class of remedies, scarcely, if ever, now prescribed. They consist of those substances which, when applied to the mucous membrane of the nostrils, excite a discharge from thence, often accompanied by sneezing and watering from the eyes. Common snuff is a very familiar example of such a substance.

Errhines were formerly prescribed in defective conditions of the sense of smell, and in amaurosis. They were likewise thought to be serviceable in various affections of the head.

ERYSIPELAS.—See 'Rose.'

ERYTHEMA.—This is a superficial inflammation of the skin, not attended by any febrile symptom, and not characterized by any tendency to form vesicles, or to be contagious. It is generally caused either by some mechanical irritation, or is symptomatic of some disorder of the digestive organs. Cotton or a little flour relieves the smarting; and when it depends upon stomachic disorder, a little alterative medicine removes it.

ERYTHRÆA CYNTHURUM—This as well as other species are not used in regular medicine, but are often gathered by the country people, and their infusion or tea used as bitter tonics, for which, indeed, they seem very well qualified.

ESCHAR.—A crust or piece of dead flesh, produced by the action of an escharotic.

ESCHAROTICS.—These are agents which, when

applied to a portion of the surface, quite destroy its vitality. Foremost amongst such must be reckoned the application of a piece of white-hot iron, or the *actual* cautery, as it used to be termed. The adjacent parts are protected by folds of wetted brown paper, and the destruction of the part to which the hot iron is applied is so instantaneous, that the remedy, perhaps, appears more painful than it is. At any rate, the *moxa*, that has sometimes been substituted for it, is certainly a more severe application.—See 'Moxa.'

The chemical escharotics were formerly called the *potential* cautery, and consisted of the alkalies, &c., which, owing to their strong affinity for water, immediately abstracted the water of any portion of the flesh to which they were applied, and so destroyed its vitality. Of these, the most common are caustic potassa and nitrate of silver, or *lunar caustic*, as it was and is sometimes termed.

Escharotics are used for two purposes, either to destroy the part, or for a secondary effect. We have an example of the former in the application of lunar caustic to exuberant granulations, or to the portions of the skin, &c., of a person supposed to have been bitten by a rabid dog. The more frequent of their employments is in order to produce an ulcer, for the purpose of counter-irritation. An issue in the neck or legs, in cases of determination of blood, or threatened apoplexy, to the head, to the chest in consumption, and to the spine in cases of chronic disease of the vertebra, is often exceedingly efficacious.

When application of the potential cautery is followed by sloughing, the ulcer is usually kept open by introducing each day into it a pea or two.

ESSENCE.—One of the names sometimes given to essential oils.

EXACERBATION.—This term is applied to indicate the increase of severity of any disease. Thus, a fever patient, who gets worse towards night, is said to have an exacerbation.

EXCITING CAUSE.—The agent that precedes and induces an attack of disease. Thus, the inhalation of the contagious matter of fever excites that disease.

EXCORIATION.—Abrasion of the cuticle.

ETHIOPS.—This word is now extinct, but was formerly used to denote any dark-coloured metallic preparation. Thus, the black oxide of iron was the *Ethiops martialis*; the black sulphuret of mercury, the *Ethiops mineralis*, &c.

EUGENIA PIMENTO.—This is the tree, the berries of which constitute the allspice.

EUPHORBIIUM.—This is the concrete juice of several species of euphorbium. It is an extremely acrid substance, causing violent irritation and inflammation in the parts with which it comes in contact. Taken internally, it is a most drastic cathartic. It was formerly employed, much diluted,

as an errhine; but it is now only used, and that, perhaps, to no great extent, as an ingredient in blistering ointments in veterinary practice.

EVERGREEN.—A plant that sheds its old leaves in the summer, after the new foliage has been formed, and which is therefore always verdant.

EXERCISE.—As has often before been stated, every part of the frame is continually becoming effete and poisonous to the system. When this is the case, such are removed from the system by the absorbents, and excreted. But it is found that this excretion does not go on with sufficient rapidity, unless a certain amount of muscular motion, or of exercise, be taken.

Any one habitually taking too little exercise, suffers from these retained effete matters. If the deficiency of exercise be temporary, the only evil results are loss of appetite and much languor; but if it be persisted in, a great variety of chronic diseases may be induced.

It is sometimes difficult to select the kind of exercise that is suitable for invalids. Riding upon horseback has been held to be particularly beneficial in cases of phthisis.

If exercise become impossible, the amount of food should be diminished.

EXHALATION.—A secretion poured out from a surface.

EXOGENS.—This is one, and the most important, of the three natural divisions into which the vegetable kingdom is divided. The members of it are distinguished by their trunk consisting of bark, wood, and pith, the last being innermost. The wood increases by new woody matter, placed on the outside each year, and it is traversed by medullary rays. The nerves of the leaves are branched and anastomosing, and the seed has two cotyledons.

EXPECTATION OF LIFE.—See 'Life, Mean Duration of.'

EXPECTORANTS.—These are therapeutical agents that facilitate the expulsion of the secretion of the air-passages. As the difficulty of expectorating depends upon various causes, very different remedies are at times expectorants. The most important of them are—

Opium,	The Gum-resins,
Antimony,	Ipecacuanha,
Squills,	Ammonia.

The opium acts by relieving irritation; the gum-resins, on account of the specific effect that they possess over the bronchial membrane; antimony, ipecacuanha, and squills, in part at least, owing to their nauseating power; and ammonia, in case of debility, in consequence of its stimulating effect.

In like manner, bloodletting and blisters often act as expectorants.

EXPECTORATION.—This, in a natural state, is the mucous fluid that lines the bronchi and air-passages. In acute inflammation of the bronchial membrane,

it becomes attenuated and frothy; in inflammation of the substance of the lungs, it has a peculiar colour, somewhat resembling iron rust, and is tinged with blood; in tubercular consumption, it often contains the cheesy matter of tubercle; and in chronic affections, is variously altered—sometimes burning, tenacious, and thick; sometimes purulent, and occasionally containing putrefactive matter, and consequently extremely fetid.

EXTRACTS.—These are medicinal preparations of various vegetable productions. Sometimes they simply consist of the juice of plants, carefully evaporated to the consistence of honey. Such, however, are now commonly called inspissated juices, and the term extract confined to evaporated solutions of plants in alcohol, vinegar, or water.

Formerly it was common to employ heat in the preparation of extracts; and as many of them contain aromatic principles, their efficacy was destroyed. But now they are made with cold water and in vacuo, and are often extremely useful preparations.

EYE.—All active animals that live in the light are provided with very distinct and elaborate organs destined for vision. Even many of the radiated animals have eyes. On the other hand, the visual organs of some active species of even the vertebrata, but which are destined to live in darkness, are extremely minute, and little developed. The mole, for example, has eyes, but they are so minute as not to be larger than pins' heads, and, moreover, they have no special or *optic* nerves; and the diminutive eyes of the shrew-mouse are actually covered with skin, from which hair grows, just as it does from the skin of other parts of the body. Indeed, it has been doubted if these animals possess anything like the faculty of vision, and if these organs have not been given to them more to let them have the perception of light, which to them is the perception of danger, than to afford them means of acquiring notions of size, colour, and distance.

In the different classes of animals, however, the utmost complexity of design is to be witnessed in the visual apparatus, one great end being the adaptation of it to receiving and concentrating into a focus the rays of light, and the other having for its end the preservation of an organ essentially so delicate. In man (and in the higher vertebrate animals) the different parts of the eye may be said to be the orbits (or sockets); the optic nerve; the globe of the eye, its coats, contents, and muscles that move it; the eyelids, the apparatus for the secretion, &c., of the tears, and the mass of fat, &c., round about the ball.

The orbits are two well-known cavities situated in the skull, and divided by the bones that form the root of the nose. The edges of them, particularly the superior or upper ones, project and protect the delicate organs that they enclose. One object of the

projection of the upper one would seem to be, to prevent the perspiration that is destined to gather "on the brow" from trickling into the eye. The front of the eye is protected by the eyebrows, even from too many rays of light.

The orbits diverge from the inside to the outside, and by this arrangement the extent of vision is obviously increased. In birds, in whom the powers of sight are far more developed than in man and other mammals, this divergency is still greater.

The optic nerves arise from the brain, and terminate in a very delicate expansion that lines nearly the whole of the inside of the ball, called the retina. Their course is tortuous, so as to allow of frequent and repeated movements of the eyeballs, and to prevent the ill effects of tension. So long, indeed, is each nerve as to allow the eye to project slightly beyond the edge of its socket in front.

The globe of the eye, as more fully explained in the body of the work, consists of two segments of two distinct spheres, having a common intersection (very near the front of the eye), and at, or nearly at, which point of intersection there is a coloured screen, or *iris*. The outer coat or membrane of the eye, behind the iris, consists of an extremely tough membrane, named the sclerotic. This envelopes and encloses about the posterior four-fifths. The anterior fifth is covered by a still tougher membrane, more flexible, and of an even texture. This is termed the cornea, and is set into the sclerotic in the manner that a watch-glass is into the face of a watch.

Underneath the sclerotic coat is found a thin, soft, and dark-coloured tunic, which is called the choroid coat of the eye. It consists almost entirely of blood-vessels, and would seem to be an expansion of the ophthalmic artery. Underneath this coat comes the choroid tunic, which secretes a pigment, black in most animals, and hence generally called the *pigmentum nigrum*, but which, in reality, is of a darkish-brown in man. At the bottom of the eye of animals that appear to be intended by nature to be of nocturnal habits, and to see pretty well in obscure places, there is none of the pigment. In what manner, however, its absence should enable them to see in the dusk, is obscure.

Underneath the pigment comes the expansion of the optic nerve, or retina, noticed above. All the posterior portion of the eyeball is kept filled by a transparent fluid—the vitreous humour—which, while it allows of the passage of rays of light, keeps these several tunics expanded.

In a deep depression in the front of the vitreous humour, and a little more inclined to the nasal than to the temporal side of the orbit, is the crystalline lens. This is a transparent and powerfully refractive gelatinous-looking substance, composed of an infinite number of concentric laminae, arranged one within another, like the coats of an onion. In

chemical constitution, the lens consists almost entirely of albumen.

Between the lens and the cornea is a small cavity, lined by a serous membrane, which secretes a fluid that constantly keeps it expanded, called the aqueous humour. The fluid is properly enough named aqueous, inasmuch as, with the exception of a small proportion of saline ingredients, it is composed of water.

In the centre of this aqueous membrane hangs the muscular curtain, or muscle, named the iris. This is one of the round muscles; and to the aperture in the centre, the name of pupil is given. This muscle contracts and expands according to the intensity of the light to which the eye is exposed. When the light is intense, the aperture, or pupil, is made less, and *vice versa*. In morbid conditions of the brain, too, the pupil becomes preternaturally expanded or contracted, and is often an important indicator of disease.

The shape of the pupil of the eye is much and curiously modified in various classes of animals. In fishes it is often imperfectly triangular; in the herbivorous animals, that are in the habit of browsing at night, as the sheep or the horse, it is oblong, and also obliquely transverse; and in the prowling carnivorous animals, as tigers and cats, and also in serpents, the pupil is round and large at night, but is merely a slit during the day. Indeed, the long narrow pupil is generally found in those animals, that while they see well enough in daytime, roam about at night; and the round one is principally present in those who decrease their visual powers by day, and commonly sleep at night. Thus the pupil of birds, almost all species of which repose during darkness, is large and round.

The eyelids are composed of an internal membrane, called the conjunctiva, which is reflected, and covers the anterior part of the eye, and an external skin, which is merely a continuation of the common dermis. Fat never accumulates about this skin, but it is extremely soft, and capable of a good deal of expansion.

Just within the margin of the orbit, or its nasal side, the lachrymal gland is situated. From this several ducts proceed, and pour the secretion of tears upon the eyelid. This secretion of tears is always going on, but it is remarkably increased by mental emotions.

For an account of the phenomena of vision, the reader is referred to the body of the work, and to the article 'Vision,' in this Dictionary.

The eye, as may be supposed, from the complexity of its structure and uses, is liable to many diseases. Sometimes the optic nerve, or retina, is palsied, and the disease called amaurosis, or, more familiarly, gutta serena, is produced. (See 'Gutta Serena'.) At other times the transparency of some of the refracting media is destroyed, and the rays of light thereby prevented from impinging upon the retina.

Such constitute the affections of cataract and glaucoma. (See 'Glaucoma.') Almost all the tunics, &c., of the eye, are liable to inflammation. (See 'Iritis' and 'Ophthalmia.') We may add here, that inflammation of one part of the eye is very apt to be transmitted to other parts, and that, if the inflammation go on to ulceration, the vitreous humour is liable to be discharged. When this is the case, it is never secreted afresh, and all the structures of the eye sink into an unpleasant-looking small mass at the back of the orbit.

EYELIDS.—These organs are liable to two or three somewhat peculiar affections. The most important of these are—

1. The *stye*, which is a small abscess that almost invariably goes on to suppuration. It is best treated by fomentations. When it has once come on in an individual, it is very liable to recur.

2. *Ectropium*.—This consists in a turning out of the eyelids, generally in consequence of attacks of ophthalmia. It is a distressing affection, being generally accompanied by continual discharge of tears and inflammations of the conjunctiva, and sometimes by ulceration of the cornea. Application of lunar caustic to the inflamed edges is often beneficial.

3. *Entropium*.—This is a turning in of the eyelids, and its cure requires a surgical operation.

FAHRENHEIT'S THERMOMETER.—A thermometer, with a scale arranged according to the manner proposed by Fahrenheit, is in common use in this country. 212° is its boiling point of water, and 32° its point of congelation.—See 'Thermometer.'

FAINTING FIT.—The term *syncope* should, perhaps, be restricted to the pathological condition characterized by failure of the circulation—(see 'Syncope'); and the term 'fainting fit' applied to the phenomena witnessed in an ordinary attack in an individual free from disease.

A fainting fit of this kind is produced by some impression made upon the nervous system. The most common exciting cause is the heat and vitiated air of a crowded room. Hence fainting fits are very common in persons of a mobile nervous temperament, such as many women have in these places.

Many people have very peculiar idiosyncracies in this respect, and fainting is induced in them by various sights and odours which have no effect upon other people. Indeed, in many instances, fainting fits are merely varieties of the *petit mal* mentioned under epilepsy.

The most perfect illustration of a fainting fit is that produced by abstraction of blood, as in cases of wounds or venesection; and this seems to indicate to us its true pathology—diminished circulation of blood through the brain.

A person about to faint has noises ringing in his ears, failure of vision, inability to concentrate the thoughts, and the countenance becomes very pale, and the brow covered with cold perspiration. He

then passes into a state of perfect unconsciousness. After a little time he recovers, and generally has for some time a painful feeling of oppression about the heart. Occasionally there are convulsions; but if these occur to any extent, it is set down as a case, not of a fainting fit, but of epilepsy.

The treatment of a fainting fit is simple and intelligible. The first thing is to remove, if possible, the affected individual from the exciting cause. Then, in order to restore the circulation in the brain, the person should be laid on the ground, with his head as low, or lower, than his body. A little water should be sprinkled upon the face, to excite to acts of inspiration, and fresh air allowed to play about his neck and face. Smelling salts may be put to the nose, taking care not to hold them there too long, for fear of inducing inflammation of the nostrils. When consciousness is returning, wine and water, or the like, may be given.

A good deal may be done to prevent the tendency to faint. Regular exercise, steady mental occupation, &c., are calculated to do this.

FALLING SICKNESS.—A popular name for epilepsy.

FARINA.—See 'Starch.'

FASTING.—This implies the excessive or total privation of food. As has often before been stated, every part of the body is continually, having become effete and poisonous, being absorbed and excreted from the system. This constant waste is replaced by constituents drawn from the blood, and the blood again is kept up by receiving new supplies derived from the food. If this supply of food be altogether suspended for a length of time, of course life becomes extinct. The symptoms witnessed in such a case are very remarkable.

For the first two or three days, the suffering from hunger is very great, and there is also, generally, but not always, much annoyance from thirst. During this period, the circulation and the animal heat remain natural. After the second or third day, these uneasy sensations usually disappear. Emaciation clearly begins to take place; the loss of weight becomes very sensible; the heart's action begins to be quicker; and the animal heat (from the carbon beginning to get expended) to fall. Then delirium comes on; beginning with slight incoherency, but often ending with the most violent raving. This last symptom is mainly to be ascribed to the blood circulating through the nervous system having become impaired in quality; but partly, perhaps, also to the system having parted with so much of its phosphorus and sulphur, two elements which we know are essentially necessary to nervous structure.

It is very rarely that we witness the total privation of food, but we often have occasion to notice the results of a systematic partial privation. And no fact in medicine is better established than that such is the cause of an increased mortality. For some observations on its action in promoting the spread of

fever, see Part II., Chap. XXV. Indeed, in most chronic complaints of the organs of assimilation, people die from slow starvation.

There is, however, an opinion prevalent, that a very considerable amount of abstinence is conducive to health and longevity, and reference is made to the great ages said to have been reached by the early Christians and by Oriental hermits, who fled into the desert, and who subsisted upon a few ounces of bread per day, and drank only water. That individuals taking no exercise, and labouring none, require less food than the active and employed, is unquestionable; but it is also unquestionable that a dietary of twelve ounces of bread per diem would soon induce death in the active and employed; and it is questionable if there is any evidence, that the persons referred to did live so long as they are said to have done.

Nevertheless, abstinence from food is an important therapeutical agent. It is, as before stated, one of the principal ingredients in the antiphlogistic regimen, and therefore employed in most acute diseases. It is also useful in many chronic ones, particularly in those induced by excessive eating. Two well-known cases, in which benefit followed the enforcement of moderate abstinence, are those of Cornaro and the Essex miller.

FAT.—This is the name usually given to the oils of animals. These vary with regard to their melting points, and other properties; but they are invariably composed of mixtures of the liquid oleine and the solid stearine (or its variety, margarine). All fats are insoluble in water, and their most important chemical constituent is carbon.

The fat of the human body varies a little, according to the locality from whence it is taken. That from the kidneys has a yellowish colour, and is solid at 64°. The fat of the ox is colourless, and solidifies at 98°. Sheep's fat, or mutton suet, as it is commonly called, is whiter and somewhat more solid than that of the ox. Pigs' fat, or hogs'-lard, is fluid at a lower temperature. The fat of geese is even softer, and has a peculiar smell and taste, and was formerly considered to possess remarkable therapeutical properties. In many of the fishes the oleine so predominates, that their fats are usually classed with vegetable oils.—See 'Oils.'

One of the most important of the animal fats in this country, in an economical point of view, is butter, as obtained from the milk of the cow.

In the body of the animal in which it is found, fat serves two purposes. It serves as a pad or cushion, for the protection of the other parts; and it is stored up to furnish carbon, to combine with the inspired oxygen of the air, in order to keep up the animal heat. This latter may be particularly seen in the case of the hibernating animals; and such before their winter's sleep are plump and fat, but towards spring are very lean, owing to their fat having been in this manner consumed.

The following contains the analysis of the oleine and stearine of the fat of the sheep, or of mutton suet:—

	Stearine.		Oleine.
Carbon,	79	...	79½
Hydrogen,	11	...	11
Oxygen,	10	...	9½
	100		100

FAVUS.—A skin disease of the scalp.—See 'Porrigo.'

FAUCES.—The space between the upper part of the gullet and the back part of the tongue.

FEELING.—See 'Touch.'

FELSPAR.—This is a very common mineral; it is one of the constituents of granite, and is a silicate of alumina and potassa, with a little lime.

FEMUR.—The thigh-bone.

FERMENTATION.—The word fermentation denotes the series of changes through which various organic substances pass in the arrangement of their elements so as to form new compounds. Besides the panary, noticed under 'Bread' (and which is not a separate fermentation), three fermentations are known—1st, the vinous or alcoholic; 2d, the acetous; and 3d, the putrefactive.

The alcoholic fermentation consists in a solution of sugar parting with some of its carbon and oxygen, and becoming converted into a mixture of alcohol and water. This change in the composition of the sugar only begins at a certain temperature, and when some azotized substance is present. This azotized substance has a catalytic action, as it is called. In the making of wine from the solution of the sugar contained in the ripe grape, the gluten contained in the grape's skin acts as this catalytic agent. In making beer from malt, we are obliged to artificially add some nitrogenous matter, and the one usually fixed upon is yeast.

The vinous fermentation consists in resolving sugar into alcohol and carbonic acid, which latter is driven off into the air. The change that takes place is thus shown:—

	Hydrogen.	Carbon.	Oxygen.	
Sugar,	3	...	3	...
Subtract carbonic acid,	0	...	1	...
Residue,	3	...	2	...
			1	which is alcohol.

The acetous fermentation takes place when an alcoholic solution is exposed to the air at a higher temperature, and essentially consists in the abstraction of oxygen. The composition of acetic acid is—

Carbon,	4
Oxygen,	3
Hydrogen,	3

The details of the changes that take place are obscure.

The putrefactive fermentation essentially consists in the nitrogen and hydrogen uniting together to form ammonia. But other compounds, as sulphuretted hydrogen, carburetted hydrogen, and the like, are also combined; and in the putrefactive fermentation of vegetables, a considerable quantity of carbonic acid is given off.

FERMENTED LIQUORS.—See 'Wine,' 'Beer,' &c.

FERN.—The rhizome of the male fern, or *Aspidium filix mas*, has been from a very early date employed as a vermifuge. It was used as such by Theophrastus and Galen. It fell out of use, but was the basis of a quack medicine; the secret of which was bought by the French Government for 18,000 francs. It is now again neglected, perhaps without cause.

FERROCYANIC ACID.—This compound acid is formed by decomposing ferrocyanide of copper. It consists of—

Hydrocyanic acid,.....	46·5
Cyanide of iron,.....	45·7
Water,.....	7·6
	99·8

If this acid is added to a persalt of iron, Prussian blue is formed, and this is one of the most decided tests of that metal.

FERULA.—This is a genus of umbelliferous plants, different species of which produce sagapenum and assafoetida.—See 'Assafoetida' and 'Sagapenum.'

FETID.—A fetid odour is one in which there is a tendency to mortification, and the putrefactive fermentation of the mortified portion. The disagreeable smell is best relieved by animal charcoal.

FEVER.—Although in the body of the work the subject of fever is considered at some length, it is thought proper, in this Dictionary, to offer a summary of our knowledge regarding it.

The events that succeed one another in a case of ephemeral fever, may be taken as a type of the disease in general. There is a feeling as if of cold water poured down the back, and of general shivering, both which sensations are experienced, from time to time, for some hours. While this is going on, there is languor, often nausea, and the circulation is languid. By-and-by these fits of shivering alternate with feelings of heat, attended with flushings of the face, &c.; and in a little the shivering, or the cold fit, as it may be called, entirely disappears, and there is great heat of the surface, an excited circulation, a hot skin, headache, and, it may be, delirium. After a few hours, this state passes away, the circulation begins to lose its unnatural vigour, the headache subsides, and a perspiration breaks out upon the skin, and then the patient, although a little weakened, perhaps, feels well again.

It is seldom, however, that we behold a person affected with one cold, one hot, and one sweating fit of a fever, and then recover. On the contrary, a case of fever, excited by malaria or contagion, almost

always comprises a long succession of these phenomena, and lasts for many days. When there is a very distinct accession of cold, hot, and sweating stages, with an interval of absence of all of them, the disease is called an intermittent fever; when these different stages are well enough marked, but when there is no very decided and lengthened interval, it is named a remittent fever; and when the interval is absent, the remission slight, and, in particular, the perspiring fit altogether absent, we have continued fever.

As in the course of remittent and continued fevers, various organs are apt to become implicated, as the biliary organs, the brain, &c., in common language, there are said to be brain fevers, bilious fevers, &c. Such expressions are incorrect, and it is only to be understood by them, that in cases of ordinary continued fever, the brain or the biliary organs are especially affected.

Continued fever is entirely a disease of temperate climates. Formerly, three varieties of it were described by nosologists, and doubtless existed—the synocha, the synochus, and the typhus. The first of these was distinguished by its inflammatory nature, by the extreme excitement of the circulation, the violent delirium, &c. Synochus also partook of these characters, but in a less marked degree; while the typhus is remarkable for manifesting, almost from the beginning of the disease or attack, a depression of the vital powers; and in cases of it, the pulse, though frequent, is feeble, the delirium is low and muttering, all the senses are obtuse, and the blood, so far from exhibiting the firm crassamentum and buffy coat of inflammation, scarcely possesses any power of coagulating at all, and is indeed, during life, disposed to exude in little patches underneath the skin, forming petechiæ, as they are called.

In point of fact, however, continued fever, as seen in this country, is at present either decidedly typhus, or very typhoid in its nature. This has probably originated in the increase of the lowest class of our large cities, among whom fever is kept up, and displays its greatest ravages.

Typhus fever is excited by a contagion that has proceeded from a person previously affected by the disease. This is usually, probably always, taken in at the lungs, and the poison would seem to be particularly active just about the time of the termination of the disease in either death or recovery. The matter of contagion, however, only produces its effect upon the constitutions of those affected by the predisposing causes, which are those that promote absorption, by diminishing the force of the circulation, and weakening the nervous system.

It is an important thing to know that the matter of contagion is quite destroyed by a moderate degree of heat. This is the reason, probably, of the absence of the disease from tropical countries, and it affords us a ready means of destroying its malignity

in the room and clothing that a patient has lived in, and had about him.

The time between the reception of the poison of contagion into the system and the breaking out of fever varies, and is often a very considerable number of days. The disease then fairly begins with a shivering fit, which soon passes into an accession of typhus. Save in bad cases, however, there is not usually delirium for some days. After this time there is commonly insensibility to external objects—although the patient can be roused, generally, so far as to answer questions—and a low muttering delirium. The pulse is usually quick, but feeble, and the temperature of the skin low; the thirst pretty considerable, but not very urgent; and the tongue and teeth are covered with a black, tenacious substance.

Typhus fever, from the depressing effect that it has upon the system, may prove fatal in itself; but it rarely does so, save in the aged. Unluckily, however, typhus fever is almost invariably associated with local inflammation of the lungs, &c., of a peculiar nature, and little amenable to treatment; and it is to the combination of the local inflammation and of the fever, that the very fatal nature of typhus is to be ascribed.

It is impossible to lay down any uniform plan of treatment for typhus fever. The patient, indeed, should always be placed in a well-ventilated room, and kept perfectly quiet. Drink should be, from time to time, offered to him, and his face and hands frequently washed, and his head shaved. But, excepting these, every special case of fever requires special treatment. Sometimes, if inflammatory attacks come on early, and the pulse be good, leeches may be applied; if the case, as too often happens, be complicated with pneumonia, tartar emetic is almost always serviceable; and those cases in which there is much stupor, are often relieved by the application of a large blister to the scalp. Generally, during the last few days of the disease, and often from the very beginning, death is clearly threatened in the way of syncope, and in such cases stimulants are indicated.

Sometimes the recovery is accompanied by a profuse perspiration, &c., and such is said to be a critical discharge. But the usual plan is for the patient, when he recovers, to get gradually better. The duration of the disease, from the first sign to the favourable or unfavourable termination, varies very much. Something between twelve and twenty days is the usual limit.

Intermittent Fever.—This is usually called ague, and at one time committed great devastation in this country, as it still does in most countries that have an imperfect system of agriculture and uncultivated swamps.

Ague is invariably produced by the action of a malaria, i.e., a miasm that proceeds from marshes and

other places from which there is rapid evaporation. This malaria is particularly liable to occur in hot countries. It extends only a little way above the surface, is absorbed by water and trees, and is unquestionably much more dangerous by night than by day.

This malaria is particularly liable to affect newcomers to the country where it exists, and those long resident are often quite free from intermittent fever. But it may be doubted if this immunity is really advantageous or not; and acclimatized individuals are generally observed to have very bad health, and to be extremely short-lived.

The poisonous matter is probably always received into the system through the medium of the lungs; but after having entered the blood, it certainly seems that it may remain latent and quite inactive for many months, if not for a longer period. Before the disease decidedly manifests itself, there is often a considerable period of slight ill health set up; the person about to be affected experiences a great diminution of mental vigour, a languor and unwillingness to move, uneasy sensations in various muscles, and loss of appetite. At length there is a decided manifestation of a cold fit; the face and extremities become pale, the features are shrunk, and the whole skin is constricted. A sensation of cold then begins to be felt, which gradually increases in intensity until it becomes so great, that the affected person shivers and shakes sometimes to an extraordinary degree.

During this stage the pulse is feeble, and often slow, and frequently intermittent. The respiration, too, is short, frequent, and feeble, and there is often nausea. Sometimes, but not commonly, there is headache, and almost invariably there is more or less thirst.

After a time, this cold stage begins to pass away, and after a little the sensation of heat is experienced, and the temperature of the body becomes far greater than it is during health. The pallid face becomes flushed, the features swell out, and the skin becomes turgid. The pulse beats fully and freely, and the respiration is quick and hurried. The head commences to ache, and the mind is frequently more or less affected.

In a little time these symptoms also pass away, and are succeeded by a new series. Upon the brow a moisture forms, and this extends to the whole surface. As this perspiration comes on, the unnatural heat abates, the pulse diminishes in frequency and becomes softer, the respiration resumes its natural state, the thirst is no longer complained of, the headache disappears, the mind becomes clear again, and, except feeling weak and exhausted, the agued man is well.

The succession of these phenomena in the cold, hot, and sweating stages, as they are called, of ague, constitute a paroxysm. When a paroxysm has

finished, after a time the same phenomena again appear; and this alternation of disease and comparative health goes on for a considerable period, and a number of such paroxysms constitute the disease of intermittent fever. In technical language, the length of time from the end of one paroxysm to the beginning of another is called an *intermission*, while the length of time from the *beginning* of a paroxysm to the beginning of the one that succeeds it, is named an *interval*. This nomenclature may be pedantic, but it is necessary for the understanding of the different varieties of intermittent fever.

These are named according to the length of the interval. If one paroxysm be succeeded by another within twenty-four hours, the fever is termed a quotidian; if after forty-eight hours, a tertian; after seventy-two hours, a quartan; and after ninety-six, a quintan. The most common form is a tertian; next to that a quartan; after that a quotidian, and the least frequent a quintan.

It is rather important to remember, however, that two intermittents sometimes attack the same individual at the same time. For instance, two tertians occasionally affect a person, each of which comes on on its own particular day, and by consequence the fit occurs every day. These are to be distinguished from quotidians by the paroxysm of each day being of a somewhat peculiar character; but those of every other day exactly resembling one another. Other kinds of double attacks of ague have been noticed; of these, perhaps the double quartan is the most curious. In it there may be two paroxysms on the first day, none on the second and third, and two again on the fourth day; or there may be a paroxysm on the first day, another on the second, none on the third, one on the fourth, and so on.

It is generally stated that a quartan is much more obstinate of cure than a tertian, and a quotidian is apt to become something like a continued fever.

The treatment of ague is pretty well understood. Of course, if possible, an affected person should be removed from all proximity to malaria; and if this cannot altogether be done, he should at any rate be removed to the highest room of the house. Fortunately we possess a drug which, from its antiperiodic action, is almost a specific in ague. This is cinchona bark. The most suitable manner of administering this is by giving its active principle, quinine. The sulphate of this alkaloid is now largely manufactured. The best plan of administering this is in a mixture along with a little sulphuric acid. Two grains is a dose; and the dose may be repeated every four hours. Unless it produce nausea, &c., there seems to be no objection to giving it during the time of the paroxysm.

If the quinine cannot be procured, two or three drachms of the powdered bark may be employed instead. This, however, is pretty sure to produce nausea, particularly if given during the paroxysms;

and to obviate this, it may be combined with a little laudanum.

Another remedy that is certainly efficacious in ague is arsenic. Owing to its virulence as a poison, it requires to be given in exceedingly small doses, and the effect even of these to be watched by a medical man.

Long-continued or frequently repeated attacks of the ague are, probably from the internal congestions consequent upon the cold fit, apt to produce enlargements of the spleen and liver, which may lead to dropsy, and otherwise prove fatal. The best treatment for such appears to be a course of iodine.

Remittent Fever.—This would seem to be ague in its most intense form. The paroxysms most distinctly alternate with remissions; but one paroxysm occurs every twenty-four hours, and the whole disease has a most malignant type. It is essentially a disease of hot countries, and is doubtless produced by malaria.

Remittent fever has often premonitory symptoms, such as indisposition for food, general lassitude, and the like. The period of the attack is indicated by the shiverings and severe muscular pains, especially of the back, followed by increased heat of the surface, headache, flushed countenance, excited circulation, thirst, and other symptoms of a hot stage. In the course of from five to ten hours these symptoms lessen, and there is diminution of the heat, and a degree of perspiration; but the patient is by no means well; the skin is still too hot, the pulse too quick, and to the violent headache succeed dull aching pains, feelings of giddiness, and the sense of exhaustion. This comparative interval is of short duration, and rarely lasts more than three hours, when the violent hot febrile attack begins to return, and in a little fairly establishes itself.

In this manner the disease goes on for five or six days. In favourable cases, at the expiration of this time, the perspiring fit becomes much more decided, a considerable perspiration takes place, and the disease is over. If this do not occur, the fever generally loses a great part of its remittent type, and becomes very like an aggravated case of typhus.

Various endemics of remittent fever vary very much in the disposition that they manifest to be of an inflammatory or typhoid nature. Some of them incline very much to the latter form, and are usually fatal. It has been stated, that when, in cases of the latter kind, the patient at the commencement of his illness declares his belief that he will not recover—a declaration that is often made—he invariably dies. Whether this, if true, be owing to the mental despondency being instrumental in producing its own accomplishment, or to some dreadful internal sensations that the sufferer cannot express in words, it is impossible to decide.

Like common fever, remittent fever is very liable to become complicated with derangements and in-

flammatory affections of the digestive organs and of the nervous system. The organs of respiration are very seldom affected.

The treatment of remittent fever is analogous to that of continued fever.

Yellow Fever.—This is the name of a most malignant fever that occurs in hot countries, and regarding the propagation of which very different opinions are maintained.

In it there is often the *malaise* and usual other premonitory symptoms of febrile attacks. In an ordinary case the attack commences with slight shivering, and very frequently during the night. After the rigor there is commonly a state of great excitement produced, accompanied by pain in the head and back, and very often cramps in the calves of the legs. The affected man lies down upon his back, throws his arms about his head, and his whole expression denotes extreme uneasiness. The eye is stated to present a peculiar and characteristic appearance. Delirium often rapidly comes on.

This state of matters continues for about twelve hours. At the end of this time a degree of moisture begins to appear upon the skin. This, however, is no indication of a remission, but, on the contrary, of a highly dangerous state of collapse. The pain of the head, &c., ceases, the surface becomes pale, and the stomach begins to manifest signs of irritability.

In a little the skin begins to assume a yellowish hue, and this is still more remarkable in the conjunctiva. The excitement passes away, and is succeeded by a deep anxiety, which is indicated by every posture of the patient and expression of his face. The tongue becomes coated with a thick and dry fur, the stomach gets painful, and vomiting of yellow bilious matter begins. Violent cramps in the legs are troublesome, and so, also, is flatulence, which in this disease seems to cause a greater amount of pain in the stomach than in any other. The delirium is now of a low muttering nature.

These symptoms may continue for from two to six or seven days, when what has been called the third stage comes on. This is characterized by an aggravation of the previous symptoms; the countenance becomes more collapsed and anxious; the conjunctiva becomes green, and the surface of the skin gets darker; black patches frequently appear upon various parts of the surface; the pulse beats more feebly; the tongue loses its yellow coating, and presents a glistening but hard appearance, and there is, which was not the case before, a great degree of thirst.

Then comes on the vomiting of a dark grumous-looking substance—the black vomit, as it is sometimes called. After this the patient either recovers or sinks.

Occasionally, yellow fever assumes a very malignant type, and proves fatal in a few hours.

Sometimes, as when it takes the forementioned type, the mortality produced by yellow fever is per-

fectly frightful. Often out of every twenty attacked, nineteen have been known to die. It is much more liable to attack white men than black, middle-aged people than the old or young, and males more than females. It likewise is much more prone to affect new-comers to a hot country than either natives or Europeans, who, by long residence, have become acclimatized.

Yellow fever probably never originates in places except those included between 40° north, and 20° south; and even within this range it is nearly or entirely absent in elevated spots, where the temperature is reduced. Thus, in the West Indian islands, it is rarely known to prevail, or even to exist, in elevations sixteen hundred feet above the level of the sea.

Medical men are very much divided in opinion as to whether yellow fever is a contagious disorder, or one caused by the inhalation of miasmata.

Bark does not seem of any use in it, and its treatment is probably exactly the same as that of continued fever.

Infantile Remittent Fever.—The two preceding remittent fevers are peculiar to hot climates. The one now under our notice is too common in our own. It prevails exclusively among children. Two modifications of it are frequently seen in practice—the acute and the sub-acute.

The acute form is only met with in children past the period of lactation. The symptoms of it usually come on very suddenly, and the child, who had apparently gone to bed in good health, is found in an hour with a burning skin, a flushed face, and a rapid pulse. He complains of headache, pain in his stomach, and thirst, and his tongue is found to be coated. A slight degree of delirium is frequently present. After a few hours these symptoms remit, and appear again in an hour or two. After a few paroxysms the disease almost always either gets well, or passes into the sub-acute form.

The cause of this remittent fever is neither a contagion nor a miasm, but something that is disagreeing with, or irritating, the susceptible assimilative system of children. It prevails during the fruit season, and also at times, as at Christmas, when a good deal of confectionery is consumed.

The treatment of this form consists in the exhibition of an emetic and a laxative or two. Occasionally a leech is permissible upon the stomach.

The sub-acute form is either a sequel of the acute, or produced by long-continued errors of diet. It is often, too, developed during the convalescence from measles and other eruptive fevers.

The paroxysms of it are not so violent as those of the acute form, but they are far more persistent. The child shows a very strong propensity to picking at every part of its body, its bedclothes, and even at those attending upon it. It becomes, too, extremely fretful and irritable; and if the disease con-

tinue long, it wastes very much, its skin hangs in wrinkles about its limbs and face, and its countenance assumes a look of a much older person. In obstinate cases the emaciation becomes extreme, and death closes the scene.

Chronic remittent fever is very often complicated with disease of the mesenteric glands.—See ‘*Tabes Mesenterica*.’

The treatment of chronic remittent fever consists in endeavouring to improve the secretions of the alimentary organs by means of alteratives, keeping up the strength in the latter stages by means of wine, and, when it can be borne, by change of air.

Hectic Fever.—The word *hectic* is derived from a Greek word that means habitual, and is applied to this fever on account of its continuity and inveterate nature. *Hectic* is not, however, a primary fever, but merely a symptom, and a very distressing and dangerous one, of other and very serious mischief going on in the system.

Hectic fever occurs in individuals in whom serious organic changes are going on, almost invariably connected with secretion of pus. It is always seen in cases of phthisis.

The cold stage in it is little marked, nor is the hot stage very violent. In the evening the skin begins to burn, and the head to ache, but there is seldom any delirium. Towards morning there is a profuse perspiration.

Two remarkable symptoms are almost invariably present in cases of *hectic*. The face is very pale, save one circumscribed spot upon each cheek, which is of a bright red hue, and the nails are turned in. Generally speaking, too, so far from there being any mental depression or confusion, the ideas are clear, and there is confidence of recovery until the last.

The treatment of *hectic* fever is unfortunately merely palliative. The most distressing symptom to the patient is usually the excessive morning perspirations, and these often seem to be mitigated by the mineral acids. Tepid sponging at night, too, often affords very considerable relief, and an opiate at this time mitigates the restlessness of the evening or night paroxysm. A nutritious diet and wine are almost always necessary.

Eruptive Fevers.—See ‘*Measles*,’ ‘*Small-pox*,’ &c.

FIBRINE.—This is one of the most important albuminous proximate principles of animals, and very closely resembles vegetable gluten. It is a large constituent of the flesh, and may readily be obtained from newly-drawn blood by stirring it with a stick. As the blood coagulates, it attaches itself to this stick. A number of red particles attach themselves to it, but these may be removed by repeated washings, and then the fibrine is obtained pure.

It has a whitish colour, is without odour, is insoluble in cold water, and is solid, tough, and elastic.

In the living body, however, fibrine is doubtless in a state of solution.

The constitution is as follows:—

Carbon,	52
Oxygen,	23
Nitrogen,	16
Hydrogen,	7

But in this analysis small proportions of sulphur, phosphorus, &c., are neglected.

Fibrine is formed by the vital powers out of albumen, and is the last stage through which food passes before it becomes converted into living flesh.

FIBULA.—The small bone of the leg.

FIGS.—The fig tree is probably a native of Asia, but it has been cultivated in the south of Europe from time immemorial. In all probability the fig tree was cultivated for dietetical purposes before corn plants, and in an early period in human history constituted the most important portion of man’s vegetable food. As a proof of the great importance formerly attached to this fruit, it may be cited, that the early Hebrews considered the want of blossoms on the fig trees as one of the most grievous calamities that could happen to them; that fig-cake, such, probably, as has, within this last year or two, made its appearance in our shops, was one of the presents with which the widow of Nabob hoped to pacify the anger of David; that in the public dinners of Sparta, figs were a prominent article of food; that their importation was forbidden to the Athenians; and that, among the Romans, figs and grapes were the emblems of plenty.

In this country, figs are only used as a dessert fruit, and then, save only amongst the very opulent, in a dried state. They principally consist of sugar and mucilage. The principal supply of them is from the Levant.

The fig tree was introduced into England three centuries ago, but it is only in the south of the island that they can ripen their fruit. Even there they are generally produced under glass in green-houses.

The fig tree (see Plate XXVIII.) attains a height of from twelve to sixteen feet. In its native countries, it produces two crops in the year.

Figs are occasionally employed in medicine, principally as adjuncts in cough mixtures. The oldest poultice of which we have any record was made of them; and Isaiah, who lived two centuries before Hippocrates, recommended them as such to King Hezekiah.

The botanical name of the fig tree is the *figus carica*. Another member of this genus, the *figus indica*, produces the banyan; and another, the *figus elastica*, the Indian caoutchouc.

FILBERT.—This is the nut of that (or those) variety of the hazel, having long husks.

FILTER.—This is a strainer used in chemical and pharmaceutical operations, either for rendering fluids transparent, by separating the impurities that make



FIGUS CARICA
THE FIG.

them turbid, or for separating and washing insoluble precipitates from the water in which one of these ingredients had been dissolved.

These are usually composed of a piece of unsized or blotting paper, properly folded and placed in a glass funnel.

As spring and river water almost invariably contain a great many impurities, these are often filtered, and in this case the best plan is to pass the fluid through a mixture of sand, clay, and charcoal. The sand separates mechanical impurities, and the clay and charcoal the chemical ones.

FINS.—A race of men inhabiting the north of Europe, of Mongolian descent.

FISH.—Fish afford a supply of animal food that can be obtained at a very cheap rate, and which is highly nutritious. In a maritime country, fish can always be obtained from the sea at the expense only of catching them. In inland places, too, there can be little doubt that the artificial production of fish for food is a branch of economy much too neglected. For the dietetical properties of the various species of fish, see 'Carp,' 'Tench,' 'Chub,' &c., &c.

Poisonous Fish.—Several fish, particularly shell-fish, occasionally become unwholesome. The diseases that they produce, however, are not often of a serious or prolonged nature.

FLAME.—This is the name given to the combustion or rapid union of many substances with oxygen. It is usually attended by much heat and light, although the amount of these varies remarkably in different instances. In burning a candle, the wax or tallow is first rendered fluid by heat, and then ascends, owing to capillary attraction, to the wick. Here the carbon and oxygen of it, together with a small portion of the same elements contained in the wick, combine with the oxygen of the air, and flame is produced. As the supply of hot vapour diminishes as it ascends, the flame tapers to a point.

FLANNEL.—This woollen texture is now very commonly worn next the skin. Wool is a very bad conductor of heat, and hence any one who wears flannel, and who happens to get overheated, has not his temperature rapidly diminished. In consequence of this property, flannel is found particularly useful to those much exposed to the weather, as fishermen, coachmen, and the like; and, indeed, all people who readily take cold, find their advantage in wearing flannel underclothing.

FLATULENCE.—Sometimes the stomach becomes distended with gaseous matter, generally evolved from slowly digesting food, but which apparently appears to be secreted by the coats of that viscus. It is almost in both cases associated with and produced by indigestion.

Its cure, of course, depends upon the affection of the digestive organs that cause it; but the unpleasant sensation may be often relieved by carminatives, soda-water, and stimulants. It is often very much

connected with acidity, and then is relieved by antacids, and often prevented from coming on by the administration of some of the mineral acids.

FLAX PLANT.—This plant, the *linum usitatissimum* of botanists, is figured in Plate XXII. It is an indigenous plant, and is extensively cultivated for the purpose of making flax, and for the sake of its oily and mucilaginous seeds.

Flax is prepared from the fibrous part of the bark. The short fibres of this are removed by heckling, and constitute tow, a substance much used in surgery and pharmacy. The manufactured flax constitutes linen, which, when scraped from lint, is so much employed in the dressing of ulcers, &c.

The seed, or linseed, as it is commonly called, is small, oblong, and glossy. The coat contains mucilage, and its internal part oil. The oil is extracted by pressure, and the mass which is left (which, however, always retains some oil) is linseed cake. Linseed meal is formed by grinding the unpressed seeds, and therefore contains much more oil than the cake. The oil was formerly much used, mixed with lime-water, as an application to burns and scalds, but cotton wad is now generally employed in such cases. An infusion of the seeds, or linseed tea, as it is popularly called, is used in irritation of the pulmonary and other mucous membranes. If prepared in the official manner, this infusion contains also liquorice. The meal of linseed is very extensively employed for making poultices.

FLESH.—This is the name given to the muscles of the body, and constitutes the great bulk of animal food. The flesh of different animals has in each one some trifling peculiarities, upon which their various tastes, &c., depend.

FLESH-BRUSH.—This is a brush used for making friction on the skin.—See 'Skin.'

FLOUR.—See the different cereal grains.

FLOWERS OF SULPHUR.—Sublimed sulphur.—See 'Sulphur.'

FLUCTUATION.—In medical language, this is the movement given to fluids in chest cavities by the hands of the medical man. It is by the impulse thus given, and which requires considerable tact to discriminate, that the formation of pus in an abscess is determined.

FLYPOWDER.—This is a mixture of metallic arsenic and its excessively poisonous white oxide. It is fortunately little used in this country, but on the Continent it is a familiar poison.

FENICULUM, or Fennel, contains a volatile oil which makes a useful addition to purgative medicines administered to children.

FOMENTATION.—This consists in applying heat and moisture by means of flannel dipped either in hot water or in a hot infusion, the most common infusions being those of camomile flowers and poppy heads.

Fomentations are extremely useful in alleviating

inflammatory pain. In bruises and sprains, they, as long as the inflammation is acute, afford great relief, and seem to act, in part at least, by relaxing the skin, and thus prevent the evil effects of the tension owing to the effusions that are taking place. It is not so easy to understand how it acts beneficially when applied to the skin in inflammations of the digestive organs, but its beneficial action in such cases is very marked. In abdominal inflammations that come on during fevers, hot fomentations appear often to do more good than anything else.

FOMITES.—It is a very general belief, that the contagion of plague, fever, &c., may attach itself to articles of clothing, furniture, &c., and thus be carried to a distance, or have its virulence preserved for a great length of time. Substances having these infectious matters attached to them are called fomites.

Perhaps the fear of these fomites has been carried to an undue length; but there can be no doubt that it is proper to expose articles of clothing, bedding, &c., that have been in the chamber of a man suffering from contagious diseases, to a thorough cleaning and a high temperature, and of even burning worthless or unimportant articles.

FOOD.—All living beings, whether animals or plants, are in the almost constant habit of receiving supplies of matter or food from without. From these the plant and the growing animal attain that increase of bulk which we so plainly behold, and from these, likewise, the adult animal keeps up the integrity and size of its body, notwithstanding the vast excretion of it that is constantly being cast from it by means of the absorbent system.—See 'Absorption.'

Although the food of animals and plants is composed of the same chemical elements, yet in one respect the members of the vegetable and animal kingdom vary very remarkably. If perfectly dead matter—such as the crust of the earth is composed of, or such as living structures become when life has left them, and they have putrefied and become manure—be put near the roots (which are the mouths) of plants, such is immediately added to the sap, and from thence goes to form, and be converted into, the growing textures of the plant. But if these dead constituents of the earth's surface, or the compounds that have been formed by putrefaction out of once living beings, be introduced into the mouth or stomach of animals, they are not assimilated and added to the structures by the medium of the blood. On the contrary, no substance can serve as food for animals that is not part of a structure that has been living and has not yet putrefied. That is to say, that animals cannot live upon mineral, but must have vegetable or animal food.

Still the chemical constituents of this mineral food of plants, and the vegeto-animal of animals, are the same; and, in fact, the mineral food of a plant can, when passed through the structure of a vegetable,

become nutritious to an animal. Hence the food even of man is derived, in the first place, from the soil; and it is necessary, even in studying merely human physiology, to have a general notion of the food of vegetables.

The vegetables used for human food consist of various compounds of carbon, oxygen, hydrogen, nitrogen, magnesium, iron, potassium, sodium, chlorine, sulphur, phosphorus, and silicon. Now, it so happens that all fertile soils contain all these so compounded as to be soluble in water; and they also contain alumina, or clay, which gives consistence to the earth, and enables the roots to obtain a firm hold in it; and also, by virtue of a very curious property of alumina, it retains a great many of the soluble compounds of the elements previously mentioned, that would otherwise filter through it, and get beyond the reach of the roots.

From this soil the roots of plants absorb portions of every one of these elements, with the exception of the alumina, or clay, which they carefully reject. These are added to their sap, and this sap deposits them in new combinations—indeed, in the various parts of their structures.

As so much is being continually abstracted from a soil, it might be expected soon to become barren; and so it would, were it not partly that the decomposition of the soil underneath, or the subsoil, and the restoration to it of dead animals and plants that putrefy, restore to it the very elements that were taken away.

These elements, abstracted by growing plants from the soil, assume in the plant very different combinations from those that they existed under in the earth. Both in the body of the Medical Guide and in some parts of the Dictionary, these have been alluded to, but it is proper here to give a short recapitulation of them.

They may all be arranged under three groups, the saccharine, the oleaginous, and the albuminous.

I.—*The Saccharine.*

The different proximate principles comprising this group, consist of carbon, oxygen, and hydrogen, and the two latter elements are united together in the same proportions as they are in water. The most important of them are—the various sugars, starch, gum, and cellulose.

II.—*The Oleaginous.*

The different proximate principles composing this group, consist of carbon, oxygen, and hydrogen, but the two latter elements are not in the same proportions that form water. The more important of them are—olein, or liquid fat, or oil; margarine, or solid fat, or oil.

III.—*The Albuminous.*

The different proximate principles comprising this group, consist mainly of carbon, oxygen, hydrogen, and nitrogen, to which smaller quantities of potassium,

sodium, chlorine, sulphur, phosphorus, &c., are attached. The more important of them are—gluten, albumen, and casein.

None of the vegetables used as food, say by the herbivorous animals, contain only one class of such proximate principles. On the contrary, most of them contain an admixture of them all. Thus oats contain—

Gluten, albumen, &c.,.....	20 per cent
Olein and margarine,.....	5 “
Starch, sugar, &c.,.....	60 “

Potatoes contain—

Gluten, albumen, &c.,.....	2 per cent.
Olein, margarine, &c.,.....	$\frac{1}{2}$ “
Starch, sugar, &c.,.....	18 “

The sulphur, phosphorus, &c., of the oil amounts to about 4 per cent., and those of the potatoes to from 8 to 15. When more particularly examined, every thousand parts of these inorganic constituents, as they are sometimes called (although improperly), is found to be made up as follows:—

In the oat—

Potash,.....	262
Lime,.....	60
Magnesia,.....	100
Oxide of iron,.....	4
Phosphoric acid,*.....	438
Sulphuric do.,.....	105
Silica,.....	27
Chlorine,.....	3

In the potato—

Potash,.....	557
Soda,.....	18
Lime,.....	20
Magnesia,.....	52
Oxide of iron,.....	5
Phosphoric acid,.....	125
Sulphuric do.,.....	136
Silica,.....	79
Chlorine,.....	36

We can now easily understand what takes place in a growing herbivorous animal, say a calf, when it has eaten a quantity of vegetable food. Every day its bones, to use the common phrase, “grow;” that is to say, it acquires so much more bulk of bone. Now, when we recollect that bone mainly consists of phosphate of lime—i. e., a compound of phosphorus and lime—we can easily understand how it gets this additional bone from its food. Then a great many parts of its body contain fat, exactly identical in composition with the oils of the food it is taking, and which fat is obviously simply derived from these oils. The bulk of the animal, which increases every day, is made up of albumen, &c.; and this is obtained ready formed from its food and fibrine, gelatine, &c., which are merely modifications of vegetable gluten, casein, and the like.

* A compound of phosphorus and oxygen.

It cannot fail to strike any one who considers the subject, that there is a very great provision made for supplying the animal with carbon. All the principles contain this element, and some, as starch and sugar, although largely consumed, are not converted into similar animal principles. In fact, there are not any saccharine proximate principles in animal structures. An herbivorous animal takes into its system a great deal more carbon than it requires to build up and keep in integrity its frame.

This carbon of the food, nevertheless, plays a most important part. The saccharine proximate principles are decomposed by the animal vital powers, and in a little the carbon thus obtained is used as fuel to keep the animal warm. It combines with oxygen to form carbonic acid, and this union is always attended by evolution of heat. When this heat has been evolved, the carbonic acid is expelled from the system.

If the saccharine proximate principles of the food of an animal fall off, still the animal can keep warm by using the carbon of its fat; and even when that is done, it can exist for a little by consuming the carbon of its albuminous proximate principles. When this is expended the fire is quenched, and the flame of life goes out.

In the case of a full-grown herbivorous animal, such as an ox, there is no need to take in food for the bones or muscles to grow bigger; but as every portion of its frame is constantly being changed and rejected, it must obtain in its food the oleaginous and albuminous principles necessary to replace them. And to keep it warm, it consumes a large quantity of the saccharine principles. If we give it an excess of the saccharine and oleaginous ones—that is to say, if we give it an excess of carbon—it deposits this carbon in the form of superfluous fat. This is what the farmer does when he prepares his animals for the butcher.

We will now consider the case of a carnivorous animal. Such only consumes the flesh of other animals—that is to say, he only takes into his stomach albuminous and oleaginous proximate principles. The action of the former is very obvious; they are immediately converted into his own flesh, and other parts of his structure. The oleaginous principles are not much deposited within his frame as fat, because the carbon of them is required to be burnt to keep him warm, almost as fast as he can obtain them; and this is one of the reasons why carnivorous animals seldom or never—never, perhaps, in a wild state—lay on much fat, unless in some exceptional cases, as that of the bear, when their food chances to be unusually rich in oleaginous principles.

Some animals, certainly, seem intended by nature to be purely carnivorous. Such are provided with strong canine teeth, suited for tearing flesh, and very small stomachs, which are suitable for the reception

of food in a condensed form, and of a nature almost identical with the chyle into which it is to be converted. Other animals, again, are clearly destined to subsist upon vegetable food, as is made evident by their small incisors and large molars, the latter of which seem purposely qualified for the crushing, in particular, of corn; and, perhaps even more remarkably, by the largeness and complexity of their digestive organs. It must always be remembered, however, that while carnivorous animals are intended to subsist upon flesh, and the herbivorous upon vegetable nourishment, that still this arrangement may be reversed, and the animals do well enough. The horse, an animal whose stomach, indeed, is small, but whose teeth pronounce him to be decidedly herbivorous in his diet, can subsist quite well upon flesh; and the dog, a decidedly carnivorous animal, can flourish upon vegetables. The basis of the diet of hounds, for example, is oatmeal; and ordinary domestic dogs live, in a great measure, upon potatoes. All this is perfectly in accordance with what science indicates, inasmuch as the composition of the albuminous and oleaginous proximate principles found in animals and plants is identical, or nearly so. And, in one sense of the word, all animals are omnivorous, inasmuch as all may have their structures kept up by food derived from either an animal or a plant.

There are, however, only two animals that are perfectly indifferent as to the source of their food, whether it be vegetable or animal, and hence that are truly omnivorous; and these are the hog and man. Whether the hog, which is probably by far the oldest created of all existing animals, was originally made omnivorous, or whether, during the long period over which his race has extended, he has been driven to the habit of omnivorous diet, and his frame been gradually affected by habits (and this we know is possible), it is not easy to decide. But man, who is the most recently created of animated beings, would certainly appear to have been originally created omnivorous in his food, and this for the purpose of enabling him to live under almost all climates, and under nearly all circumstances. In arctic regions, for instance, much vegetable food cannot be obtained; and in tropical ones, while food from an animal source is tough, indigestible, and almost immediately running to putrefaction, vegetable products abound.

But while the genus Man, and a great many of his species, are omnivorous in fact as well as in constitution, by far the greater part are almost entirely herbivorous; and another, but a very much smaller section, are carnivorous in their habits. The lower classes in almost all hot climates, and the majority of those of the same rank inhabiting moderately temperate countries, are (if we except milk and cheese) herbivorous in their feeding. A Scottish ploughman, for example, perhaps the most comfortable of all those who perform merely manual labour, does not in

general taste butcher meat more than once a week. The inhabitants of Greenland, and analogous places, feed almost entirely on flesh. A diet derived entirely from the animal kingdom, and, indeed, one derived from animals and grains, is very apt to induce scurvy (see 'Scurvy'), a certain amount of fresh vegetable food being apparently necessary. A diet exclusively vegetable does not appear to be attended by any inconvenience.

Perhaps the best example of a mixture of the different kinds of food is found in milk. This fluid contains an albuminous proximate principle, or cheese; an oleaginous, or butter; and a saccharine, or milk-sugar; besides having a number of inorganic constituents. Hence it is qualified alone to entirely nourish and afford materials for the increasing structure of young animals.—See 'Milk.'

Another very good example of a mixture of the different kinds of proximate principles is afforded by the cereal grains. The gluten is an albuminous proximate principle; the starch a saccharine; and, as before stated, they contain oil—an oleaginous principle. It is proper, however, to remember that the greater part of the oil is contained in the husk, and that fine or dressed flour, i.e., flour from which the husk is separated, is not so nutritious as flour in which the bran is allowed to remain.

The flesh of animals—that is, ripe fat—contains an abundance of albuminous proximate principles, and fat or oleaginous. But if the animal be lean, then only albuminous are present, and the meat is very deficient in nourishing properties; and this is the reason that animals require to be fattened for the butcher.

Fluid drinks are chiefly useful in a dietetical point of view, by supplying the system with the water that it requires. But some also contain nutritious proximate principles, as soup, which is a solution of most of the proximate principles of the flesh and vegetables that are put into it, and wine, &c., which owe their properties to alcohol, one of the saccharine proximate principles.

Preservation of Food.—As long as an animal or vegetable structure is living, the elements that compose it, provided that it be an article of food, are so joined together as to form starch, sugar, gluten, and the like, all of which are palatable and nutritious. Further, if we destroy the life of a structure, for a little time the life remains, as it were, about it, and the elements composing it still form these palatable and nutritious compounds. This, however, is only for a time. Flesh and green leaves, or those of spinach, for instance, very soon cease to be as they were, and even dried roots and seeds always tend to form new combinations. This is caused by their elements joining with the elements of the air and water around them, and then they form compounds that are not palatable; and being now fairly restored to the inorganic world, are not nutritious. This process is called

putrefaction, or the putrefactive fermentation. The starch, for instance, of corn, which is pleasant to the taste, and when swallowed is assimilated to the system, becomes converted by putrefaction, in part at least, to carburetted hydrogen, which is not palatable and cannot be digested; and the gluten, which is sapid and can be converted into fibrine, and the fibrine itself, are by this process of putrefaction mainly resolved into ammonia, which is unpleasant to the palate, and altogether non-nutritious.

By art, however, this tendency of plants and animals to run on into the putrefactive fermentation may be altered and modified, and it is now nothing uncommon to eat meat, and drink milk, that has circumnavigated the globe, and which are as fresh as they ever were. This has been of the greatest possible utility to sailors; but even on land, it is often of great consequence to be able to retard and procrastinate this putrefactive fermentation. Many kinds of fish have to travel so far, that, were not some anti-putrefactive plan employed upon them, they would be useless ere they reached their destination; and in hot weather, both fish and flesh often need preserving. And as only one crop of fruit, corn, and potatoes, can be obtained in a year, the preservation of them becomes essential, in order to have a continuous supply.

When we consider that water is necessary for putrefaction, one obvious mode of preventing decay is, to deprive a substance of its water. As air is likewise indispensable, another plan of hindering an article of food from putrefaction is, to hinder the air from having any access to it. Lastly, there are certain substances, called antiseptics, that have the remarkable property of preventing putrefaction. (See 'Antiseptics.') As instances of these, we may cite salt, sugar, and vinegar. Being in possession of these facts, we can understand the action that takes place in the usual modes of preserving food.

If a substance be frozen, its water, or at any rate its liquid water, is most effectually taken away, and its decay rendered impossible. In this manner, in northern latitudes, meat is very commonly preserved, and so also in this country, is salmon kept fresh. Freezing, however, does not answer with regard to vegetables that contain much starch, as, by the process of freezing, starch is converted into sugar. But those vegetables that contain little starch, as green gooseberries, peas, &c., may be preserved in this manner; the cooking of such, however, requires a certain degree of nicety. They must be very slowly thawed; and if this be not attended to, they run on to putrefaction in a few minutes.

About forty years ago, M. Appin received from the French government a reward of 12,000 francs, for a new method of preserving vegetables, fruit, meat, fish, and milk. This method has been found to be quite successful, and articles of food prepared by it will keep fresh an indefinite length of time,

and are now constantly used in the cabin on board ship. It consists essentially in altogether preventing the access of air. First of all by boiling, or otherwise cooking the viand to be preserved, the air is driven from the internal parts of it, and at the same time the albumen is coagulated. This latter is of importance, solid albumen being not nearly so prone to putrefy as when in a liquid state. The boiled meat, or parboiled vegetable (if vegetables are fully boiled, they become too soft, and fall down), is then carefully packed in a tin canister. In the case of meat, strong gravy is poured upon it, and in that of vegetables, water with a little salt, the object in either case being to fill up interstices. The canister being *thoroughly* (this is essential) full, a tin cover is carefully soldered on the top, one little aperture being left. The canister is then put into boiling water, the heat of which drives off any air that may still be amongst the provisions, and likewise expands the ingredients. While thus hot and expanded, the aperture is soldered up, and the whole allowed to cool. If the sides of the canister collapse a little, it indicates that the air has been completely expelled, and is a proof that the operation has been successful.

With regard to apples and pears, and, but to a much less extent, with other fruits, advantage may be taken of the fact, that fruits ripen, although very slowly, when removed from the tree, and that, until they are ripe, they do not begin to putrefy. Hence, if gathered before they are ripe, they gradually become sweet, and the time that they would occupy ere they become putrid is prolonged.

Most roots will keep until spring, if kept moderately free from the air. Thus potatoes, in general, do quite well if covered over with straw and earth in *pits*, as they are usually called, although they are now nearly universally placed upon the surface of the ground.

The preservation of meat by M. Appin's plan is a delicate process, and such meat sells at a dear price. Hence the ordinary mode of preserving meat is by sending through it salt, or a mixture of salt, saltpetre, and sugar. The changes that take place in this process have recently been investigated by Liebig, who, however, appears to have used in his experiments salt alone, a practice very seldom adopted in this country.

"It is universally known," he says, "that in the salting of meat, the flesh is rubbed and sprinkled with dry salt, and that, when the salt and the meat are in contact, a brine is formed, amounting in bulk to one-third of the fluid contained in raw flesh. I have ascertained that the brine contains the chief constituents of a concentrated soup, or infusion of meat, and that therefore, in the process of salting, the composition of the flesh is changed, and this, too, in a much greater degree than occurs in boiling. In boiling, the highly nutritious albumen remains in

the coagulated state in the mass of flesh; but in salting, the albumen is separated from the flesh, for when the brine from salted meat is heated to boiling, a large quantity of albumen separates as a coagulum." There is also, according to Liebig, a quantity of potash dissolved out by the brine; and if this be correct, it may explain the rule that experience has laid down in this country, that it is proper to add to the salt used in curing meat, some saltpetre, or nitrate of potassa. The brine also takes away from the flesh a portion of its phosphates.

Liebig found that a salt which contained a mixture of chloride of calcium and chloride of magnesium, was so far preferable to pure salt, that when it was used the phosphates were not dissolved out. But there can be little doubt that the method now becoming common in this country, of substituting sugar for a portion of the salt, is better still.

Any vegetable article of food may also be preserved in a strong brine, made of four pounds of salt dissolved in a gallon of water. The German *sour kraut* (see 'Cabbage') is often thus prepared, although a little oil is sometimes added.

Vinegar is used in this country as an antiseptic, particularly for vegetables intended to be eaten as pickles. Most of the vegetables so preserved, however, contain so much water, that were this not previously removed, the antiseptic nature of vinegar would not be strong enough for their preservation from putrefaction. This is generally removed by common salt, a substance which has a great affinity for water. When this substance is thrown upon such watery vegetables, their water joins it, the brine so procured is poured off, and if vinegar be then added, they are preserved from decay, or pickled.

When meat or fish is smoked, *i. e.* exposed to the vapour from burning wood, its decay is prevented. This is partly owing to its receiving pyroligneous acid, but also partly to the other principles evolved in the destructive distillation of wood.

In the case of ripe fruits, as cherries, plums, &c., spirit is sometimes used as the antiseptic, but the usual substance employed to preserve such, is sugar. Some fruits, as the pulpy ones—such as apricots, plums, and the like—are preserved in syrup; others, as cherries, and sometimes currants, orange and lemon peel, are preserved dry. A *marmalade* is made of preserved juice and rind, a *jam* of juicy fruits, a *jelly* is a concentrated preserved juice, and a *conserve* is a fruit or other vegetable production beat into a mass with sugar.

FORMIC ACID.—This is an acid that was first obtained from ants. It is now easily obtained artificially, and is believed to be the oxide of the radicle formyle, the chloride of which substance is chloroform.

FRECKLES.—These are small, round, yellow, or greenish-yellow spots, generally of no great size,

and which appear in some individuals on those parts of the body that are exposed to the action of light. Sometimes a number of them cluster together. They are almost peculiar to persons of a light complexion and fair hair.

No treatment has any effect upon freckles.

FREEZING MIXTURES.—When a solid is transformed into a liquid, a great quantity of heat becomes latent, and the temperature, as indicated by the thermometer, falls. Mixtures in which this takes place are called frigorific, or freezing mixtures, and are sometimes very useful. The following table exhibits a few of such, with the amount of depression of the thermometer that they produce—

Mixtures.	Parts.	Thermometer sinks.	Degree of cold produced.
Phosphate of soda,.....	5	} From 0° to — 34° 34°
Nitrate of ammonia,....	3		
Diluted nitric acid,.....	4		
Phosphate of soda,.....	3	} From — 34° to — 50° 16°
Nitrate of ammonia,....	2		
Diluted mixed acids,....	4		
Snow,.....	3	} From 0° to — 45° 46°
Diluted nitric acid,....	2		
Snow,.....	8	} From — 10° to — 56° 46°
Diluted sulphuric acid, 3			
Diluted nitric acid,....	3		
Snow,.....	1	} From — 20° to — 60° 40°
Diluted sulphuric acid, 1			
Snow,.....	3	} From 20° to — 48° 65°
Chloride of calcium,....	4		
Snow,.....	2	} From — 15° to — 68° 53°
Chloride of calcium,....	3		
Snow,.....	8	} From — 68° to — 91° 23°
Diluted sulphuric acid,10			

FRICTION.—Rubbing portions of the body either with the hand, or with some interposed material, has long been in use. In many slight cases of congestion near the surface, slight friction with the hand, or a little oil, is often useful; and when the congestion is deeper seated, friction by means of hair brushes, or stimulating liniments, by reason of the counter-irritation that they produce, are of utility.

FRUIT.—In the language of botany, the fruit is that part of the plant in which the seed is lodged, but it is applied in ordinary and in dietetical language, to those seed-cases which are eatable, and which belong to the endogenous division of plants. At any rate, the cereal grains belonging to the exogens are not termed fruits.

The species of cultivated fruits are not numerous in this country, and belong to a few natural families. Most of the following cultivated British kinds will be noticed in their places—

Apples.	Quinces.
Pears.	Raspberries.
Plums.	Strawberries.
Cherries.	Grapes.
Apricots.	Figs.
Peaches and Nectarines.	Gooseberries.
Medlars.	Currants.

FRUIT, PRESERVATION OF.—See 'Food, preservation of.'

FRYING.—See 'Cooking.'

FUEL.—This is any combustible substance that is artificially employed for producing and keeping up heat. Originally, wood was doubtless the only fuel, as it now is the prevalent one, of many parts of the world. Another frequent source of heat is derived from the combustion of peat, or turf, which is condensed vegetable matter. The most useful fuel of all is coal, which consists of ancient forests that have been fossilified under great pressure. Of late, instead of burning the coal in open fire-places, or stoves, it has been proposed to convert it into gas, and to burn the carburetted hydrogen so procured. In this manner the temperature of the room can be suddenly raised, and when this increased temperature is no longer desirable, it may be at once extinguished, and thus much of the unnecessary waste of fuel that now takes place be avoided.

FUMIGATION.—This is the application of substances in a state of vapour to the body, or to different parts of it, for therapeutical purposes. Fumigations to particular parts of the body were formerly much employed, but are now little or not at all used. Fumigations for the purpose of destroying smells, and the matter of contagion, have long been, and are still much depended upon. Formerly, gunpowder, pastiles, &c., were the agents employed, but these only substituted one strong smell for another, and were probably of no use. Chlorine, in various forms, is now used for this purpose, and really destroys the offensive miasma as effectually as it banishes colours.

The manner in which Mr. Faraday fumigated a penitentiary, will give an example of how the operation may be managed on a large scale. The space requiring fumigation in this case, amounted to two millions of cubic feet. A quantity of salt reduced to powder was taken and mixed with an equal weight of peroxide of manganese, and to this mixture two parts of sulphuric acid previously diluted with one part of water were added.

The mixture, before having the acid added to it, was divided into a number of common earthen pans, each holding about three pounds and a half. The contents of each of these was then well stirred, placed in different parts of the building, and all apertures closed.

FUNGI.—Under this name, botanists include the various species of mushrooms, toadstools, and the numerous smaller growths, known by the common names of mouldiness, dry rot, mildew. They are all cryptogamic vegetables, which, however, in many of their properties, have strong alliances with members of the animal kingdom. For example, they are said not to absorb carbonic acid, but oxygen, from the atmosphere, and they certainly, when they are not poisonous, resemble, in containing so large a

proportion of albuminous proximate principles, the flesh of animals.

Fungi are, in temperate countries, extremely numerous; but in tropical ones they are extremely rare. They commonly prefer damp, close, and ill-ventilated places, and, in general, avoid light. Many species are edible; and some which act as poisons to people in this country, constitute common articles of food to the Russians.

In Plate XXIII. the three most common of the poisonous fungi of this country are figured.

For farther information regarding fungi, see 'Fungin' and 'Mushrooms.'

FUNGIN.—This is the name given to the fleshy substance of mushrooms, when it has been purified by digestion in a hot solution of alkali. It is a very compound substance, and probably varies very much, according to the species of mushroom from which it is obtained.

FUR.—Furs have been used by the civilized inhabitants of Europe since the sixth century, but were for long esteemed great articles of luxury, and only used by the opulent and noble. In the reign of Edward the Third, English subjects were prohibited their employment, unless they could spend one hundred pounds a year, a sum equivalent, probably, to nearly two thousand pounds of modern money.

Furs make very warm clothing fabrics, mainly owing to the large quantity of air contained in the interstices between the down and hair. This air, being a very bad conductor of heat, prevents the natural heat generated by the body from being carried off.

Most of the furs in use are obtained from North America, various animals residing in which are provided with very warm natural coverings, in order to make them able to sustain the intense cold. In England there is a peculiar species of fur, that is obtained from the silver-tipped rabbit of Lincolnshire; but although largely exported to Russia, it is in little or no demand for home wear.

FURNACE.—The most common example of a furnace is a common fire-place, which, as the heat given out is nearly sufficient to melt silver, is very suitable for almost all pharmaceutical and most chemical processes. When the substance to be heated is on a very small scale, a lamp-furnace is generally employed, and a current of air is generally made to play in the interior of the flame, and consume the smoke, which would otherwise darken the bottom of the vessel in which the substance is heated. For the reduction of metallic ores and assaying, blast and reverberatory furnaces are specially constructed.

GALACTOMETER, or LACTOMETER.—This is an instrument for ascertaining the purity of milk, an article that is very extensively adulterated. It has been ascertained, however, that the usual adulterations are water, and the mixture of skimmed milk

with new, the compound being sold as exclusively new milk. In either case the fraud may be detected, by ascertaining the quantity of cream a given quantity contains. This is done by placing it in a long graduated tube, and noting the quantity of cream that rises to the top when it is allowed to stand. Good fresh milk, too, has a density of about 1032; and if, on testing it with a hydrometer, we find that it has a density much lower than that, it may be inferred that water has been added.

GALBANUM.—This drug has been known from a most remote antiquity, and was used in medicine by Hippocrates. Nevertheless, the tree that produces it is not yet known, nor, indeed, is the precise country from which it comes ascertained; but it is probably the produce of a tree that grows in Syria and Persia.

Two kinds of galbanum are found in the shops—one which occurs in round yellow tears, and another which comes to this country in lumps. The latter is by far the most common kind, and consists of large irregular masses, of a brownish colour. Galbanum has a balsamic and peculiar odour, and has the therapeutical action of the gum resins. It is principally employed in chronic catarrh, and externally as a plaster. This plaster is applied to indolent tumours, with a view to disperse them—an action which it is very doubtful if it ever does—and as a slight stimulant and counter-irritant to the chest in chronic pulmonary affections.

GALENA.—This is the native sulphuret of lead, and is the richest ore of that metal.

GALL.—The nutgall has been employed in medicine from a very early epoch, and Hippocrates used it both internally and externally. Nutgalls are formed upon the bark of the *Quercus infectoria*, or Dyer's oak, a native of Asia Minor, in a curious manner, by a little insect called *Ognips Gallæ tinctoria*. This beetle is furnished with a borer, by means of which it is enabled to perforate the outer membrane of the leaf-buds of this species of oak, upon which tree only is it to be found. In the hole thus made it deposits its eggs, along with an acrid liquor which it has the power of excreting. The irritation thus produced gives rise to an increased flow of the sap to the part, and the result is an excrescence or gall. In the inside of this gall, the insect undergoes its transformations—the egg being hatched into a maggot, the maggot being converted into a pupa, and the pupa into a perfect insect, which latter perforates the gall and escapes.

Galls principally come from Turkey, and, in commerce, are sometimes known by the name of Turkey galls; but a number are also brought from Bombay. Two kinds are found in the shops—the black or blue, which are gathered before the insect has escaped; and the white, which have not been taken from the tree until the insect has left. The latter are considered inferior.

Nutgalls have the following composition:—

Lignine,.....	63.0
Salts,.....	2.4
Mucilage, &c.....	2.4
Gallic acid,.....	6.2
Tannic acid,.....	26.0

100.0

The tannic acid is remarkable for forming ink with a sesquisalt of iron; and leather, with gelatine. —See 'Tannic Acid.'

Nutgalls are very powerful astringents, and are used both externally and internally, in hemorrhages and other relaxing diseases. They have also been employed in cases of intermittent fever.

GALL.—Another name for bile, or the excretion separated from the circulation at the liver.

GALLIC ACID.—This acid was discovered by Scheele. It exists in many astringent vegetables, and particularly in the gall nut, whence its name. It is mixed with two other acids, one of which is the tannic, or the tanning principle. It is deposited in the form of small crystals, from an aqueous solution of galls. It would appear that a portion of the tannic acid acquires oxygen from the air, and becomes converted into gallic acid; and indeed some have supposed that no gallic acid exists ready formed in galls, but that it is all the product of the oxidation of the tannic.

Gallic acid is now used in medicine as an astringent.

GALLON.—This is an old British measure of capacity. In Scotland, in the reign of King David, it was decreed that it should contain twelve pounds of water; namely, four of sea water, four of still water, and four of running water. Up to the legislation on the subject in the reign of George IV., various gallons were in use, according as to whether wine, ale, corn, or dry goods were to be measured in them. The new imperial gallon contains ten pounds avoirdupois of water, of which it is declared 252.458 grains fill a cubic inch. The imperial gallon, therefore, contains 277.274 cubic inches.

GALL-STONES.—Various portions of the bile are apt to solidify in the gall bladder, and to form gall-stones, or biliary calculi. When such is the case, they sometimes give little inconvenience; sometimes they produce abscess and ulceration of the coats of the biliary passages and the parietes of the abdomen, and are discharged externally; and sometimes, as is most frequently the case, they pass along the gall ducts, giving rise to marked and distressing symptoms.

Generally speaking, the pain that they produce in so doing is most intense. It is generally referred to the pit of the stomach, extending round by the right side to the back, and it occurs in paroxysms. In the intervals, however, there is often a dull pain experienced. The pulse, during even the height of

the paroxysm, is rarely at all increased in frequency; and a violent pain at the pit of the stomach, extending round to the back, occurring in paroxysms, and without the paroxysm having any effect upon the pulse, may generally be referred to the irritation produced by the passage of the gall-stone. Usually, in these cases, the pain all at once ceases, owing to the escape of the stone into the intestine.

The treatment of such paroxysms consists in the administration of opiates, and the use of the warm bath, the effect of both being antispasmodic, and favourable to the relaxation of the duct.

GALVANISM.—Two views are taken of the nature of electricity, of which galvanism is only a form. The one supposes that it is merely a property of matter, and the other that its phenomena are occasioned by a peculiar kind or form of matter, which has never yet been rendered cognizable to the senses, but the existence of which is inferred from its effects. The latter view is certainly the more convenient to the student.

Taking this view, then electricity must be conceived as a very attenuated and imponderable fluid, which is present in all bodies in a latent state. It can, however, be rendered sensible, and made to exhibit its phenomena, which are cognizable to the senses, although the electricity itself is invisible.

If, for instance, two dissimilar substances, as two metals, are isolated, no electric phenomena are to be witnessed. But if two metals are placed in a liquid which dissolves one of them, the electricity is at once developed and exhibited, and that form of electricity called voltaic electricity or galvanism. For ordinary purposes, the two metals almost uniformly employed are zinc and copper, and the fluid in which they are immersed is dilute sulphuric acid. When these two metals are placed in the acid, and brought into contact with one another, the zinc begins to dissolve, the electricity appears, and flows from the zinc to the copper, and from the copper returns to the zinc. The current commencing at the zinc is usually called *positive* electricity, and that proceeding from the copper, *negative*, although they are equal in power, and possess the same properties. When these two electricities meet each other they combine, and no more manifestation of electricity is perceptible to any of the senses.

A number of zinc and copper plates, joined by wire, and immersed in diluted sulphuric acid, constitute a galvanic battery. The electricity proceeds along a wire that comes from the outer zinc plate, and from another wire that comes from the outer copper plate.

One of the most remarkable properties of electricity, is the power that it has of decomposing compound fluids, and of resolving them into their elements. It has, too, the power of exciting muscular contractions; and, principally on account of this last property, it has been employed as a therapeutical agent.

Galvanism is much more conveniently applied to the body than ordinary electricity, on account of its uniform and continuous action. But, as stated under 'Electricity,' no decidedly good effect is known to follow the application of this imponderable agent.

GAMBOGE.—See 'Camboge.'

GARLIC.—This is a hardy perennial plant, having bulbous roots. It is a native of the south of Europe, and is cultivated in our gardens, although on a small scale, for the sake of its bulbs. These bulbs contain five or six little cloves. The odour of these is strong and peculiar, and the taste hot.

In the southern countries of Europe, garlic is an article of daily consumpt, and it appears to be necessary to promote the digestion in very hot weather. In this country, it is rarely used as a seasoning. In medicine, it is occasionally, but very seldom employed, although the plant is officinal in all the three pharmacopoeias. It has been recommended in cases of enfeebled digestion and chronic catarrh, and externally as a counter-irritant, and as a stimulant when put into the ear in chronic deafness.

GARNET.—This precious stone, of which several varieties occur, is a silicate of alumina and oxide of iron.

GAS.—This is the name given to an elastic fluid, which, at ordinary temperatures, even under considerable pressure, maintains its æriform state. By means of considerable pressure, however, many gases can be liquefied. For instance:—

Atmospheres.

Sulphuric acid liquefies under a pressure of.....	3
Chlorine.....	4
Ammonia.....	6½
Sulphuretted hydrogen.....	17
Carbonic acid.....	36
Hydrochloric acid.....	50

The liquid carbonic acid, if exposed to the air, evaporates so rapidly as to produce sufficient cold to solidify itself. It then forms a white snowy-like substance.

GAS-LIGHTING.—When coal (or oil and other carbonaceous substances) is exposed to destructive distillation in closed vessels, an inflammable gas is produced—carburetted hydrogen. The existence and inflammable nature of coal-gas has been long known; and, indeed, nearly two centuries ago, Dr. Clayton made it. He distilled coal in a retort, and obtained "phlegm, black oil, and a spirit," which he was unable to condense, but confined in a bladder. The phlegm is water, the black oil coal-tar, and the spirit carburetted hydrogen. Dr. Clayton used to make the gas escape from the bladder, and amuse himself by setting fire to it, but the idea of using it as a practical illuminating agent never seems to have occurred. In the middle of last century, Dr. Watson prepared coal-gas, and conveyed it through

pipes from one place to another; but it was not until almost the end of the century that Mr. Murdoch, a Cornish engineer, illuminated his house and offices with it. For a long time the use of coal-gas slowly increased, and is, except in rural places, now almost universal.

Gas has also been prepared on the large scale from oil, and the oil-gas was for a time rendered portable. It was forced into strong vessels with a power equal to nearly five hundred pounds upon the square inch, and was thereby so condensed, that a vessel about the size of a quarter of a foot, would hold as much as would burn for some hours, and which could, of course, be moved about from place to place. But coal has always superseded the use of oil in gas-making. The supposed deleterious effect of gas-light upon the eyes is unfounded.

GASTRIC JUICE.—The secretion of the stomach is a mixture of muriatic acid and pepsine.—See 'Pepsine.'

GELATINE.—This is an albuminous animal proximate principle. It is obtained by boiling skin, bones, &c. It is characterized by forming a tremulous jelly when cold. Glue and isinglass are more or less impure forms of gelatine.

GENTIAN.—Gentian-root is the most frequently used of the pure bitters. The botanical name of the plant that furnishes it is *Gentiana lutea*, a native of the Alps of Austria and Switzerland. The roots are collected by the peasants of Switzerland and the Tyrol, and exported to this country in bales.

It is much employed as a tonic, and seems to agree better with phlegmatic, torpid individuals than with those of an irritable temperament. It is prescribed—

1. In dyspepsia, and other chronic diseases of the digestive organs characterized by debility, and where no irritability is present.
2. In convalescence from acute disorders.
3. In intermittent diseases.
4. In all diseases characterized by debility, and which are not attended by fever, or gastric irritation.

Gentian is a constituent, and perhaps the most active one, of the Duke of Portland's powder for the gout.

GHEE.—This is a preparation of butter made by the Indians, and which has the property of resisting the putrefactive fermentation for nearly a year. The milk, when taken from the animal, is boiled for an hour or two, and then cooled, and a little *lyre* or coagulated milk added to it. After standing for a few hours, it sours, and contains a quantity of coagulated matter. The cream at the top is then skimmed off and churned. The butter so obtained is mixed with salt and betel leaf, and although it has a strong smell and taste, it is much relished by the natives. The reason that it does not putrify is owing probably to the caseine being separated, and

none of that principle being mixed with the butter.

GIANT.—Men sometimes exist whose proportions differ considerably from those of other men. When much larger, they are named giants, and when smaller, dwarfs. The height of an ordinary man may be held to vary from five feet to rather more than six feet. One of the king of Prussia's tall regiment measured eight feet and a half, and the skeleton of O'Brian, the Irish giant, which is preserved in the museum of the College of Surgeons, measures eight feet, so that the actual height of this man must have been more than eight feet. On the other hand, Bebe, the king of Poland's dwarf, was only twenty-two inches high; and the skeleton of a Sicilian dwarf, in the museum of the College of Surgeons, is only twenty inches high.

Generally speaking, both giants and dwarfs are badly formed. The head, for example, is almost always too small in giants, and far out of all proportion to the rest of the body in dwarfs.

GIDDINESS.—See 'Vertigo.'

GILLS.—The respiratory organs of fishes.

GIN.—This is a spirituous liquor, prepared by flavouring corn-spirit with juniper, and often, it is believed, with turpentine. Hence, gin, properly speaking, is a liqueur.

Hollands Gin, or Geneva, is made by fermenting a solution of corn and juniper.

GINGER.—Ginger was known to the ancients, and at present is much used both as a drug and as a condiment. The part used is the rhizome of the *Zingiber officinale*, an endogenous plant, cultivated in many parts of Asia and Africa. The young shoots put forth in spring are also eaten, and are known in this country as preserved ginger.

Two kinds of ginger-root, or rhizome, are sold in the shops—a black and a white; but it is not ascertained whether the difference depends upon the mode in which they are prepared for market, or whether they are produced by different varieties of the plant.

Ginger contains a volatile oil and a soft resin. Chewed, it acts as a sialagogue; swallowed, it acts as a stimulant, first to the stomach, and then to the whole system, particularly to the organs of respiration. It is much used, both alone and in combination, as a stimulant in atonic and flatulent dyspepsia. It is extensively employed to correct the tendency to chill of weak fermented liquors, and ginger-beer is a very popular summer beverage.

The essence of ginger of the shops is a very strong tincture.

Ginger is also sometimes employed externally, and a plaster made by mixing warm water and powdered ginger, and applied to the forehead, is said to be very efficacious in relieving nervous headache.

GINSENG.—This is a Chinese drug, so much esteemed in that country, that at Pekin it is said to be sold for its weight in gold, and regarding which

the most extravagant tales are told. It is affirmed to ward off fatigue, restore youth, and to grow in the most inaccessible parts of Chinese Tartary, where its collection is attended with dangers which appal the boldest.

The ginseng that has been brought to this country is a mild aromatic, which possesses little or no therapeutical action, and is considered to be the root of a Panax.

It has been doubted, however, if this be the real ginseng, as it has seemed improbable that such extraordinary accounts should have no foundation.

GIZZARD is one division of the stomach of birds. It is situated at the lower or intestinal end. In birds of prey, whose food is concentrated, it is a mere membranous cavity, but in the granivorous birds it is furnished with very powerful muscles. Its lining membrane is very hard and thick, and on two sides opposite to each other are two hard callous spots. These granivorous birds swallow, along with their corn, pieces of sand, &c., and by these being rubbed, along with the grain, together, by the sides of the gizzard, the corn is ground down, so as to be acted upon by the digestive organs. The bits of stone, gravel, &c., thus swallowed, act as the teeth of quadrupeds.

GLANDS.—A gland is an arrangement of the bloodvessels, for the purpose of a particular secretion taking place from the circulating fluid, with a duct leading from it to carry away the secretion.

The most important system of glands is that of the absorbents, through which the absorbent vessels pass. These are only found in mammals and birds, and are altogether wanting in other animals. The glands for the purpose of elaborating known products from the blood, are described under their different heads.

GLASS.—This is a transparent brittle substance when hot, but flexible and tenacious when cooled after being heated, composed of sand and an alkali. It is, when warm, very ductile, and scarcely acted upon by any substance. Hence, both in domestic economy, in chemistry, and in the arts, it is exceedingly useful and much employed.

There is a tradition that glass was accidentally discovered by some sailors who had a cargo of soda on board, and who landed on the banks of the river Belus, a small stream that flows by the base of Mount Carmel. These mariners, says Pliny, finding no stones to place their pot upon, took portions of their cargo for this purpose, and lighted a fire upon the sand. The heat melted the alkali and the sand, and produced transparent streams of glass. Glass, however, was known to the ancient Egyptians, and pieces of it are frequently found by the side of mummies.

Until almost quite comparatively modern times, glass was only used for making the drinking cups, &c., of the luxurious. In England at least, al-

though a few church windows were glazed, glass was never used for closing the lattices of private houses until about three centuries ago. Even then the panes were removed and laid by, whenever the family temporarily quitted the residence. Even so short a time as two centuries ago, only the upper portions of royal palaces in Scotland had the windows glazed, the lower flat having merely wooden shutters to exclude or let in the air and light.

GLAUBER'S SALTS.—This is the old name for sulphate of soda, and is so named because it was discovered by Glauber, a laborious chemist and alchemist of the sixteenth century. This salt was some time ago very extensively used in medicine, but is now almost superseded by the sulphate of magnesia, which possesses similar actions, but which is not quite so nauseous to the taste.

Glauber's salts occur also native as a mineral body.

GLAUCOMA.—This word is derived from the word *γλαυκος*, bluish, and is applied to a disease of the eye, in which the pupil loses its naturally black colour, and becomes clear, or of a dullish blue hue.

The disease consists in chronic inflammation of the deep-seated parts of the eye. It comes on in middle-aged people usually, and in such of them as are either gouty or scrofulous. It really appears, too, to prevail more extensively in some countries and classes than in others.

The symptoms of it are pain in the head about the eye, difficulty of vision, and a greenish colour of the pupil. As the disease advances, the pupil becomes more discoloured, and the vision more impaired, and at last it is entirely lost, and the iris becomes motionless.

Almost all the deep-seated membranes of the eye seem to be affected, and the change of colour is probably owing to the *pigmentum nigrum* not being duly and properly secreted.

The early treatment should be antiphlogistic, but the disease, when chronic, does not seem to be amenable to art.

GLOBUS HYSTERICUS.—In many cases of hysteria, a sensation of a ball is felt as if ascending to the throat, where it induces the feeling of choking. This distressing symptom is sometimes relieved by antacids and carminatives.

GLOTTIS.—See 'Larynx.'

GLUCINUM.—This is the metallic base of the earth glucina, an oxide that exists in the beryl, emerald, &c.

GLUE.—This is an impure form of gelatine, prepared by taking the horns, clippings of hides, and hoofs of animals, and boiling them. The solution thus obtained is filtered and evaporated. It is then cooled, cut into thin portions, and dried upon netting. When properly prepared, glue is of a brown colour, and nearly transparent. When required for use, it is broken into bits, and dissolved in hot water. If

a solution of it be applied with a brush to two pieces of wood that are placed in juxtaposition, as it cools it parts with its water and joins them as a cement.

GLUTEN.—When the cereal grains and other vegetable products are put into a coarse bark and washed with water, the starch is carried away, and what is left behind is mainly the proximate albuminous principle—gluten. As obtained in this manner, it is a thick tenacious mass. When dried, it diminishes in size, and becomes hard, brittle, and glistening. It is insoluble in almost all fluids. It contains—besides carbon, oxygen, hydrogen, and salts—about fifteen per cent. of nitrogen.

GLYCERINE.—This is the base in those compound bodies that are called oils or fats, and which are now regarded as manganates, oleates, or stearates of the substance.

GNEISS.—This is the oldest of the stratified or metamorphic rocks, and is derived from previously existing granite, and is, of course, composed of the same minerals—quartz, felspar, and mica.

GOLD.—This metal has been known from the most remote antiquity, and was as much valued by the ancients as it is in our day. It was indeed, probably (owing to its occurring native), the first metal discovered by man, and has certainly been in use for three thousand years.

Gold never occurs as an ore, but always native, either alone, or associated with other native metals. It is found exclusively in primitive formations, or in the alluvium formed by their debris. In the latter form it is much comminuted and mixed with sand; and is usually called gold-dust. A piece of native gold is represented in fig. 1, Plate XXVI.

Gold is of a fine yellow colour, and is susceptible of a very high polish. It is not hard, being, in fact, about as soft as lead. Its specific gravity is 19. It is remarkable for its malleability, and gold-leaf may be made only the twenty-thousandth of an inch in thickness. It is also remarkably ductile, and a grain of it may be drawn into 500 feet of wire.

Some of the salts of gold are employed medicinally in France. Of these, perhaps the most active is the chloride. It is employed in scrofulous and cancerous cases. Its dose is one-twentieth of a grain.

GOOSE.—This well-known domestic fowl affords a nutritious article of food. There is in general a large quantity of oleaginous matter mixed among its muscular fibres, and this makes the digestion of it sometimes slow.

The liver of the goose has been a favourite article among epicures for a very long period. By means of pampering and confinement, the livers of geese can be made to enlarge, and these overgrown livers were much relished by the Romans, and constitute now-a-days the *pâté de foie, d'oie de Strasburg*.

Geese are remarkably long-lived animals. Willoughby knew of a goose that was eighty years of age, and which might perhaps have lived eighty more,

if it had not been put to death on account of its mischievous nature in killing the goslings.

GOOSEBERRY.—This bush, *Ribes grossularia*, is indigenous in this country. It will ripen its fruit in the most northern part of the island at the level of the sea; and at latitude 57°, it brings them to perfection at a height of 900 feet above that level.

The name of gooseberry is probably derived from its fruit having been made into a sauce for young geese.

GOSYPIUM.—This is a genus of plants found in both hemispheres, and remarkable for having their seeds enveloped with a substance—cotton—admirably suited for weaving into cloth.

GOULARD LOTION.—Goulard was a French apothecary, who introduced a solution of diacetate of lead into notice as a local sedative. The shops keep an officinal solution of diacetate of lead, and by mixing one part of this with about twenty or thirty of water, Goulard lotion is made. The best mode of applying it, is by means of pieces of cloth kept constantly wet with it.

GOURDS.—Gourds are produced by many species of cucurbitaceæ, and those used for culinary purposes are all obtained from the genus *cucurbita*. The vegetable marrow is the fruit of the *Cucurbita ovifera*, and the squash gourd of the *Cucurbita melopepo*.

GOUT.—This disease is so named from an old theory, that it arose from a morbid matter deposited drop by drop (*goutte*) into the joints. Its professional name is podagra, foot-pain.

The attack of gout usually begins an hour or two after midnight. The patient is awoke by a pain in one of his feet—usually in the ball of his great toe, but occasionally in the instep, heel, &c. There is at this time a little shivering. The pain becomes greater, and febrile heat is set up. At length the pain becomes very intense, and continues so until about the next midnight, when it abates, usually very suddenly; a perspiration breaks out, and the patient sleeps. Next morning, the toe, or affected part, is found red and swelled. This paroxysm is repeated, but more mildly, several times, until at length the disease disappears. Previous to the attack, the stomach is almost always much out of order, while, after it, both the digestive organs, and all the other organs of the body, perform their functions with great ease and facility. This extends even to the mental functions.

After a period, which may be some years, the disease again returns, and after some time the intervals become very short, and, in some cases, at last of all, the patient is hardly ever free from it. In these chronic cases, the pain is less intense, but the general health never gets the recovery that it does in the acute and early form, and other joints besides that of the toe are attacked.

Another remarkable phenomenon often accompanies

MINERALS.



GOLD.



SILVER.



CALAMINE.



MALACHITE.



CUBIC IRON PYRITES.



HEMATITIC IRON ORE.



CUBIC LEAD ORE.



BROWN PYRITES.



OBSIDIAN.



CARNETS.



EMERALD.



STRIPED JASPER.



ORBICULAR GRANITE.



BARYTES.



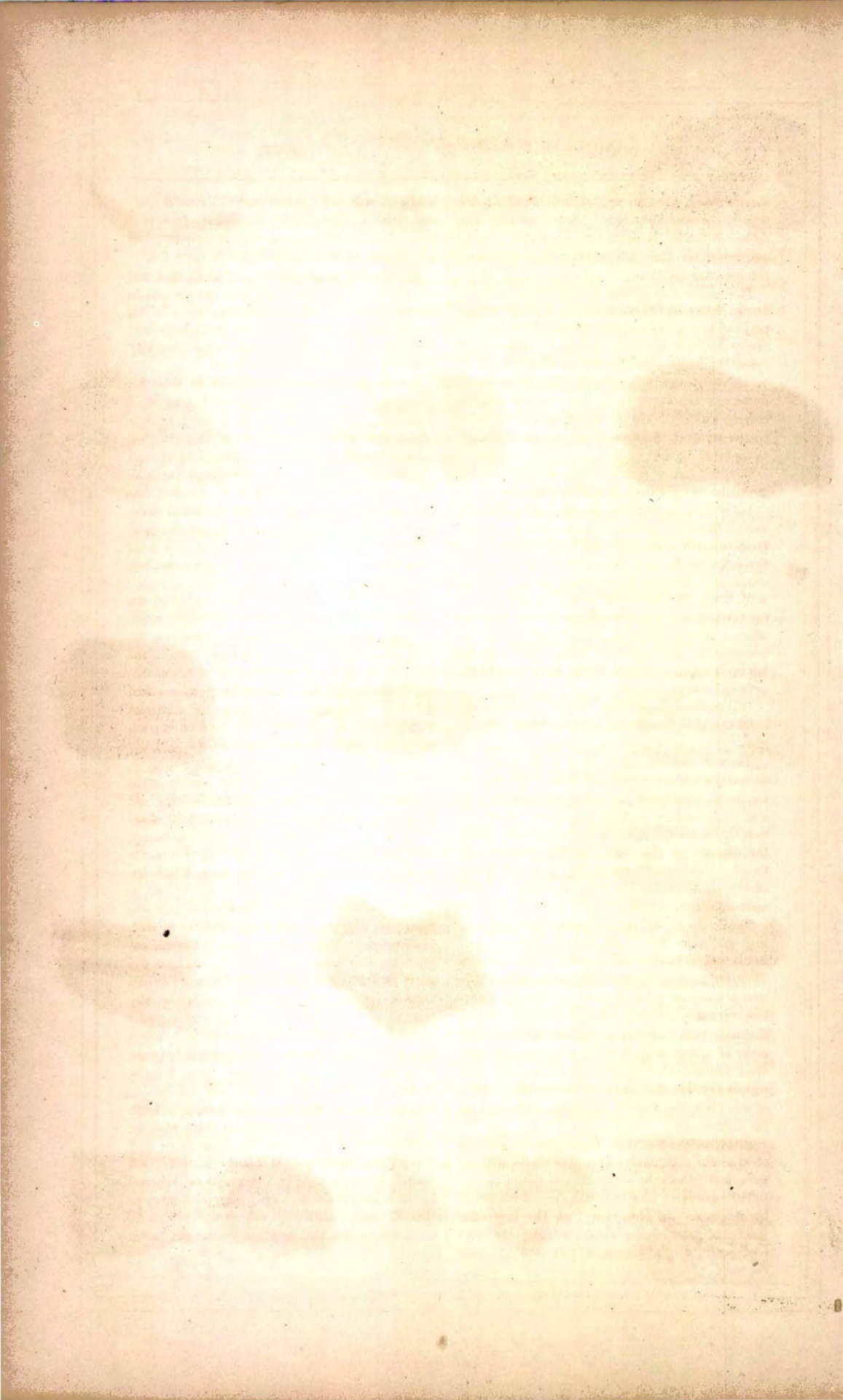
CALCAREOUS SPAR.



GREEN LEAD ORE.



RED PORPHYRY, WITH
WHITE FELSPAR.



chronic gout. Concretions that look like chalk are deposited around the affected joints. At first this deposited matter is fluid, but the water is soon evaporated, and the chalk stones, as they are called, become quite dry.

This remarkable disease is certainly hereditary. It may, however, be induced in an individual having no predisposition to it, by certain habits of life immediately to be noticed. But, in the majority of cases that happen, the disease is a family one. It occurs, too, more frequently in men of a robust frame, having large heads, and "whose skin is covered with a thicker *rete mucosum*, which gives a coarser surface." And gouty patients are very liable to nephritic diseases.

Gout is a disease mainly of the male sex, and it generally does not come on until middle age.

Individuals, also, liable to gout, are subject to various disorders of the stomach, the heart, the lungs, and the nervous system. Of these, indigestion is the most common, and with it there is usually combined a good deal of hypochondriasis. Palpitations, fits of dyspnoea, even something like angina, are also common, while, when the nervous system is affected, there is giddiness, difficulty of hearing, and tendency to apoplexy. All these symptoms are known to depend upon the gout, from their disappearing after a paroxysm.

It is common to call these symptoms, when they occur in a gouty subject, irregular, lurking, or atonic gout.

There is another variety of gout, in which the disease commences in the usual manner in the great toe, or in some other joint, and in which the pain and inflammation suddenly disappear from the member, and some internal organ, generally either the stomach or the brain, becomes violently affected. This is called retrocedent gout, and is one of the most decided instances of what is called metastasis.

The habits of life before-mentioned as inducing gout are, a too liberal allowance of butcher-meat and fermented liquors, with too little bodily exercise. Thus, amongst agricultural labourers and the like, gout is a disease quite unknown, whilst, among butlers, coachmen, and such people, it is very frequently excited. It is, however, among the higher classes, many of whom daily consume much animal food, drink a considerable quantity of wine, and use little regular exercise, that gout chiefly prevails. Many of this class, too, have a hereditary disposition to the disease.

It is a curious fact, that, while a liberal allowance of wine and malt liquors favours or causes gout, no such effect follows the use of distilled spirits.

The occurrence of a fit of the gout, however, is by no means an indication that the individual affected is guilty of excess and indolence. In those predisposed to the disease, a very trifling cause

brings on an attack. Thus, powerful mental emotion or fatigue often induces it. So, too, does very slight external injury, as sometimes the pressure of a tight shoe, or even, it is said, the bite of a flea.

With regard to the pathology of gout, there can be little doubt but that it depends upon a certain morbid matter formed in the organs of assimilation, accumulating in the system, and which is evolved at the joints, &c. This morbid matter is, very probably, either lithic acid or a lithate.

It is for this reason that attempts to cut short the paroxysm of gout, by plunging the feet into cold water, &c., have often proved fatal, owing to their driving the morbid matter to some internal organ, the affection of which proves mortal.

Although a paroxysm of gout rarely proves fatal, yet the gout is generally held to be a disease that shortens life, and insurance companies almost invariably exact a higher premium from gouty subjects.

The treatment of gout naturally arranges itself under two divisions—that during the paroxysm, and that in the intervals.

No ordinary antiphlogistic treatment is of the slightest use in gout. On the contrary, any repellants, as the application of cold or venesection, are very decidedly injurious. Formerly, indeed, the soundest physicians were compelled to assert, that the treatment of gout consisted in "patience and flannel." Now, however, we know that colchicum relieves the pain, and shortens the duration of gout, while it may be administered with perfect safety.

The best mode of administering this remedy is, perhaps,* to give from forty to sixty minims of the colchicum wine in a saline draught at bedtime, and thirty drops the next morning in a mixture of infusion of senna and Epsom salts, and, if necessary, to repeat this sequence. "In this way the pain is usually calmed, and the swelling reduced in a few days, or even, as if by a charm, in a few hours."

For some time the use of colchicum in gout was considered dangerous, and it was maintained that, besides cutting short the paroxysms, it likewise cut short the lives of those who took it, and that few gouty patients, cured by means of colchicum, survived more than a year or two. But this is now generally believed to be erroneous, and that the fatal results that have occurred in such instances have arisen from too sudden exposure to the cause, and a return to an active life. "I apprehend," says Watson, "that the proper way to eradicate the lurking residue of the mischief is, to continue to give small doses of the colchicum—five minims of the wine, for instance—two or three times a day for a while. And I think that the dregs, if I may so speak, left behind it by a gouty paroxysm, may be dispersed by the continued use of what, in the usual acceptation of that word, I may call alterative doses of colchicum—doses, that is, which produce the desired

* Watson.

purpose gradually, and by insensible operation; so I think it probable that many a fit of the gout might be averted, if the remedy were given in the same way upon the first occurrence of the ordinary premonitory symptoms. Many of these troubles appear never to reach the crisis of a fit. There are headaches, attacks of asthma, derangements of the digestive organs, which, occurring in a gouty person, are presumed to be fainter intimations of the presence of the gouty poison in the blood: and if such symptoms yield, as unquestionably they do, to colchicum, the presumption draws near to proof."

With regard to the treatment in the intervals, a good deal depends upon the age and constitution of the individual. If he be young and vigorous, abstinence and regular exercise are unquestionably effectual, either in altogether preventing further attacks, or in rendering such very mild. But, with regard to the aged or the atonic, the case is very different; and it is found that gentle exercise and a moderate allowance of good cheer are absolutely indispensable.

In both cases, however, a regular life, an avoidance of an occasional excess in eating or drinking in one day over another, and early hours, are indispensable.

Various medicines have, from time to time, been proclaimed as able to grant immunity from the gout. One of the most famous of these is the celebrated Portland powder, which consists of a mixture of bitters and aromatics, and which, as it tends to increase the tone of the digestive organs, may be of use. Another boasted preventative consists of a mixture of rhubarb, aloes, and canella. Sir H. Hallford was in the habit of recommending some bitter infusion, with tincture of rhubarb, and bicarbonate of potassa.

If, during a paroxysm of gout, the disease leave the extremity, and the stomach become affected, the symptoms are very distressing, and often mortal. There is violent pain in the stomach, with much vomiting, and the tendency to die in the way of syncope. Antacids, opium, and stimulants, are the medicines indicated, and the disease should be attempted to be brought back to the toe, &c., by irritating the previously affected joint.

GRAIN.—A measure of weight. It was enacted, in the reign of Edward III., that grains of wheat should be taken from the middle of an ear, and that thirty-two of these should make a pennyweight, and twenty pennyweights an ounce. In the Avoirdupois weight there is no such standard as a grain, and the grain of the apothecary is the twentieth part of a scruple.

GRAINS OF PARADISE.—These are hot aromatic seeds brought from the Guinea coast, and are used as stimulating stomachics. They are produced by a species of the *Anomum*.

GRANITE.—This is still a very abundantly occurring rock, and there can be no doubt but that, at

previous geological epochs, it was even more extensively present in the crust of the globe. It differs from all other rocks, except the volcanic ones, in not being stratified—a clear indication that, before it condensed, it was a molten mass under the influence of great heat.

Granite consists of three minerals—quartz, mica, and felspar; but one is sometimes wanting, or its place taken by hornblende. The proportions in which they exist, too, and the accidental mixtures they contain also, are very variable. Hence there are a great many varieties of granite. The colour, in particular, of several varieties of granite is very diversified. The felspar is red, yellow, green, grey, and white; the mica is grey, white, brown, or black; and the hornblende is green or black. The mica and felspar are always crystallized, and sometimes very beautifully so.

Owing to its hardness, granite is much valued for certain economical purposes, as paving, &c. It is, however, difficult to work, and requires to be kept under water when separated into blocks.

GRAPE VINE.—The grape is the produce of the *Vitis vitifera*, a plant indigenous in Persia, Asia Minor, &c. It requires an amount of heat to ripen its fruit, which is only to be found (in the northern hemisphere) south of the 44th degree of latitude. Accordingly, in this country, it requires to be cultivated under glass in an artificial temperature.

Grapes, as an article of diet in this country, are only used at dessert, although dried grapes, under the name of raisins and currants, are much employed in pastry. Grapes are beneficially administered in febrile affections, for the purpose of relieving thirst.—See 'Wine.'

GRAPHITE.—This mineral occurs in the earlier stratified rocks, and is known as black-lead. It contains, however, no lead, but is composed of carbon and a little iron. It is used for making pencils, for crucibles and portable furnaces, and also for polishing iron.

GREYWACK.—This is the name of a geological formation, composed of quartz, felspar, &c., in small pieces, cemented together by clay.

GRAVEL, in mineralogy, signifies small fragments of rock that have been drifted by means of water. Gravel, in medicine, is a disease in which sand-like matter is deposited in the bladder.—See 'Lithis' and 'Diathesis.'

GREENSTONE.—This is a rock composed of felspar, mixed with either hornblende or augite, and in which these two minerals may be distinctly observed.

GREGORY'S POWDER.—This is composed of magnesia, rhubarb, and ginger, and is an excellent antacid and stomachic purgative.

GROUSE.—Three species of grouse inhabit the British Islands—the black cock, the common red grouse, and ptarmigan. They all feed upon heather,

and it is believed that the rich flavour of their flesh is, in some degree, dependent upon this.

GUAIACUM.—This wood was introduced into Europe by the Spaniards in the early part of the sixteenth century, and was held in such esteem that it was sold for seven gold crowns the pound. The guaia tree is a native of Jamaica and St. Domingo. Its timber is imported into this country under the name of *lignum vite*, and is much used by the turner for making pestles, skittle balls, and other hard pieces of turning ware. The turnings, or raspings, are bought up by the druggists and apothecaries. These are distinguished from all other woods by nitric acid, which communicates a temporary bluish green.

The wood contains a peculiar resin—guaiacum resin—to which its properties are owing. This resin is likewise employed in medicine. It exudes naturally from the tree, but is generally obtained either by wounding the stem, or by the action of heat upon the wood. It is generally met with in the shops in lumps, often of a considerable size, and commonly mixed with pieces of wood, bark, and other impurities. They are of a greenish-brown colour, and of a brilliant, shiny, resinous fracture. Their odour is somewhat balsamic, and their taste slight, although they leave a burning sensation in the throat.

Guaiacum is an acrid stimulant. Given in small and repeated doses it is an alterative, and in large ones it produces a sensation of heat in the stomach, loss of appetite, nausea, and acts powerfully upon the skin.

It is principally useful in chronic rheumatism, chronic skin disease, and scrofula. The decoction is, perhaps, the best form of administering it.

GUDGEON.—This is a small fish, common in many of the rivers and brooks of this country. It is from four to six inches long, white in the under parts of its body, and having its upper parts olive-brown, spotted with black. Its flesh is delicate.

GUINEA FOWL.—This bird is a little larger than the barn-door fowl, and, when young, the flesh of it is, perhaps, the most juicy of all the poultry tribe. The eggs, although small, are considered to be well flavoured.

GUINEA PEPPER.—These capsules are the fruit of the *Capsicum frutescens*. They are about an inch in length, and two or three lines broad, of an orange-red colour, and of an aromatic and very pungent taste. Their powder is Cayenne pepper.

GUINEA WORM.—This is the *Filaria medinensis*. It is hatched in the subcutaneous cellular tissue of the human body. It generally occurs in small numbers, rarely more than ten or twelve, although more than fifty have been met with in one individual. This parasite is peculiar to a few hot countries, and is particularly prevalent in Guinea. It usually

attacks the natives, but Europeans are occasionally affected.

It is not ascertained whether it enters the system by the water that is drank, or whether it is communicated by the water used in bathing and washing, but the natives are unanimous in referring to the water as its origin. Most probably its eggs are swallowed in the drinking water, and find their way into the blood.

This worm appears to have the power, when generated in the cellular tissue, of somewhat changing its position. By so doing, a degree of inflammation is set up, which ends in the formation of a pustule on the surface, from which a quantity of discharge proceeds, with, at last, in favourable cases, the expulsion of the Guinea worm. This suppuration is often attended with considerable pain and swelling of the adjacent parts.

The treatment consists in, by careful manipulation, promoting the extraction of the worm whole. If it be broken, a number of young filaria escape into the wound, and there excite great irritation. If the worm be drawn out entire, the wound or ulcer soon heals.

GULLET.—See 'Esophagus.'

GUM.—Gum is a saccharine proximate principle that is formed very abundantly in the different parts of the structures of most plants. When contained in them, it is probably almost always in a state of solution in water. When, however, it is separated from them, a portion of its water is separated from it, and it is, as it is always found in commerce, a solid. Gum consists of carbon, oxygen, and hydrogen, the two latter elements in the same proportions that they exist in water.

The solution of gum in water is called mucilage. It is soluble alike in cold as hot water, and is not soluble in alcohol; it is not immediately susceptible of the alcoholic fermentation. By these properties it may be distinguished from the other saccharine proximate principles.

Gum is employed in medicine as an emollient and demulcent, and also as a vehicle for administering other substances in. Sometimes it is slowly dissolved in the mouth in order to allay troublesome cough, and to diminish irritation of the throat by protecting it from the action of acrid secretions. It is also administered in inflammatory conditions of the mucous membrane of the intestines, &c.

As a vehicle for exhibiting other medicines, gum is employed in the form of powder or as mucilage. In the former case, its action is to give bulk to small doses of heavy drugs, as to calomel and tartar emetic; in the latter, to suspend insoluble powders, as oxide of zinc, &c.

GUM RESINS.—This is a very improper name, as these substances are in no way gums, nor do they belong to the saccharine class of proximate principles. They are secretions formed by certain

plants, that are generally composed of a mixture of a resin and an essential oil. They are all solid, heavier than water, generally opaque and brittle, and have an acrid taste and strong smell.

The following are the gum resins:—Assafoetida, ammoniac, euphorbium, galbanum, myrrh, and scammony.

GUM-BOILS.—These are local inflammations of parts of the gum, generally ending in suppuration. They are almost always caused by the presence of a piece of decayed tooth. Although the abscess that they form is usually small, and the quantity of pus secreted little, the inflammatory effusion of serum often extends to the adjoining parts, and the cheek or whole face becomes much swollen. The application of warmth by means of hot flannel, &c., alleviates the pain and promotes the suppuration, and thereby shortens the course of the affection.

GUTTA SERENA.—This is the old name for amaurosis, or blindness owing to some morbid condition of the optic nerves. It was so called from the old doctrine, that all diseases were owing to some deleterious fluid or humour; and as this malady of the eyes, unlike most of the diseases of that organ, neither produces pain nor deformity, the epithet *serena* was added. It is alluded to by Milton, who suffered from this form of blindness, in his address to light:—

“ But thou
Revisitest not those eyes that roll in vain
To find thy piercing ray, and find no dawn,
So thick a drop *serene* hath quenched their orbs,
Or dim suffusion veiled.”

Amaurosis is brought on by a number of causes. Sometimes it would seem to depend upon a congested state of the bloodvessels, and at others upon an opposite state, and to be connected with debility. It is sometimes caused by the pressure of a tumour upon the optic nerve. It has been known to have followed a slight blow upon the naked eyeball, and then is exactly analogous to a concussion of the brain. The most frequent causes, however, are overstraining the organs of vision, as happens to astronomers watching an eclipse of the sun; hard students, particularly if they read much by night, and those whose occupations compel them to attentively regard very minute objects, as watchmakers and the like.

The symptoms of amaurosis vary with the part of the nerve affected, and the cause. The only constant one is the gradual loss of the power of vision. Somewhat curiously, the blindness does not, in its early stages, resemble a cloud intervened between the eye and an object looked at, but appears like a wavy mixture of light and darkness. There is often a degree of pain felt in the organ and in the brow, and much exertion of the sight is painful and fatiguing. The complaint is most usual after the middle

period of life, is certainly hereditary in some families, and, when one eye becomes affected, the other in general becomes implicated.

Gutta serena is said to be common in countries where the snow lies long on the ground, and the Esquimaux guard against it by wearing snow-spectacles, which are made of pieces of wood, having a small circular aperture, through which the wearer can discern objects, but which admit very few rays of light to the eye.

Confirmed amaurosis is seldom or never recovered from. In its early stages, however, its development may be arrested or stopped by treatment. This, when the cause is suspected to be too great congestion of the vessels about the eye and brain, consists in abstinence, depletion, and darkness, but when a reverse state of the system seems to be a probable cause, in a tonic regimen.

There is a kind of temporary amaurosis, which occasionally comes on in hysterical and hypochondriacal subjects. This is an affection of no serious consequence. The treatment of it consists in trying to remove the hysteria and hypochondriasis.

GYMNASTICS.—Among the ancients, various gymnastic exercises were systematically followed as a part of their hygiene. Rural sports and travelling have, in a great measure, supplanted them in the present age, but in many institutions, particularly in young ladies' schools, there is no doubt but that the want of proper exercise has a very injurious—and a permanently injurious—effect. Dr. Forbes, from his own observation, states that, in one boarding-school, there was not one girl who had been there two years who was not more or less crooked. And something like this seems to be true of a great many such establishments. All this indicates a want of exercise, and also that the exercise taken is of too restrained a nature.

GYPSUM.—This is the popular name for sulphate of lime. When it occurs in a compact and crystallized state, it constitutes alabaster, and when in the form of soft stone (when the water is driven off by means of heat), plaster of Paris. It is gypsum that generally communicates to water the property called hardness, and in which state it cannot dissolve soap, at least not in its usual quantity.

HÆMATEMESIS.—This is bleeding from the stomach. It is more a symptom of a disease than a complaint in itself, and too often an indication of serious organic disease in the organ from which it proceeds. Like any other hæmorrhage, the blood in hæmatemesis rarely proceeds from a ruptured vessel, save in cases of injury, or when, as has happened five or six times, a large vessel has been laid open in consequence of chronic ulceration. It is somewhat remarkable, that marks are sometimes found in the stomachs of people who have died from other diseases, which indicate that a vessel has been ruptured by ulceration, and yet that, by some natural

process, the hæmorrhage has been stanchèd, and the ulcer healed.

In almost every case of hæmatemesis, the blood is exhaled from the mucous membrane of the stomach, and simply escapes through the natural pores or channels, which it cannot enter so long as the fluids and solids of the body retain their healthy condition.

Bleeding from the stomach would seem never to take place independently of any change of structure in the stomach or other viscera; at least it never occurs in children in the same manner that bleeding from the nose does. In cancer of the stomach it is a very common symptom, occurring in that affection from a very early period of its invasion. Then, again, it is sometimes witnessed in such diseases of the heart as obstruct the venous circulation. More frequently, however, it is symptomatic of diseases of the liver and spleen. It is, indeed, very easy, from the connection between all the veins of the abdomen, to see that a congested state of either liver or spleen would produce a congestion of the submucous capillary tissue, which will be relieved by the effusion of serous fluid on the surface nearest the outside, thus producing a dropsy; or by hæmorrhage from the mucous membrane on the inside, and in this manner producing bleeding from the inside of the intestines or the stomach. This latter affection constitutes hæmatemesis.

It is not known, however, what it is that determines whether these morbid states shall be relieved by a bleeding or a dropsical effusion. It is ascertained that hæmatemesis is usually caused by the circulation in the liver being obstructed, owing to the portal veins being *shrunk and contracted*, and to the spleen being *enlarged*.

There is also another form of gastric hæmorrhage quite distinct from the above, and which is produced by the morbid conditions of the blood that occur in purpura and scurvy.—See 'Purpura' and 'Scurvy.'

Whenever blood is exhaled by the mucous membrane of the stomach, it appears to be always in considerable quantity. As blood in the stomach acts as an emetic, much nausea comes on, which is followed by vomiting. The blood ejected is always of a very dark colour, which is owing to the action of the muriatic acid of the stomach. Sometimes the blood is mixed up with a quantity of dark grumous matter, of the colour of coffee grounds, and this appearance is uniformly, or nearly uniformly, found to be connected with malignant disease of the stomach.

Hæmatemesis occurs between the ages of thirty and fifty, and is very rare either in children or in old people.

The treatment of hæmatemesis must, of course, vary according to its cause. In many cases where it depends upon disease of the liver or spleen, it may be doubtful as to whether it should be checked

or not. In ordinary cases, perfect quiet, with cold drinks, are, perhaps, all that is necessary. If the bleeding continue, and the sufferer become debilitated, astringents, of which the best, perhaps, is acetate of lead, are indicated.

Very frequently hæmatemesis is suspected when there really is no such disease. In bleeding from the nose, some blood is very often swallowed and vomited up. Strange enough, it is one, too, of the diseases fixed upon by impostors, and feigned.

HÆMOPTYSIS.—This is bleeding from the lungs, or rather from the mucous membrane of the lungs. It is sometimes idiopathic, and constitutes a disease in itself, in which form it is very rare, and, perhaps, not very dangerous; but more usually it is symptomatic of other diseases, especially of phthisis, and then is a very serious business, owing to such diseases being absolutely of an incurable nature.

The blood in hæmoptysis hardly ever proceeds from a ruptured vessel. Even in phthisis, in which large holes or vomica are made by ulceration in the lungs, a vessel seldom pours out its contents. Usually the blood is exhaled from the surface of the mucous membrane, and that, in the great majority of cases, either in consequence of tubercular consumption, or organic disease of the heart.

Of these, the former is the more frequent. In consumptive patients, spitting of blood is sometimes the first symptom of the mischief that is going on in the lungs. At other times, however, the hæmoptysis does not appear until the other symptoms of phthisis have been developed, and then the first attack of it is occasionally fatal. In a pretty extended series of observations, it was found that, of every six that died of consumption, spitting of blood was the first indication of the disease in two; it did not come on in three until the other symptoms (see 'Phthisis') had been observed, and in the remaining one case there was no spitting of blood at all.

It is usually stated, that it is the disease of the right side of the heart that is so prone to induce hæmoptysis, but it would appear that it is as frequently, or more so, brought on by organic disease of the left. In either case it is, of course, the interruption of the circulation through the lungs that causes the congestion in those organs, and the subsequent bleeding.

There is the greatest possible difference as to the quantity of blood excreted in different cases of hæmoptysis. Sometimes, but not often, it is so great that the patient dies at once, either suffocated or from syncope; at other times there is only a drop or two, and between these two every degree of gradation may be observed.

Hæmoptysis, in those predisposed to it, is excited by any cause that hurries the circulation, as active exercise, straining, singing, loud speaking, playing on wind instruments; or causes acting upon the

nervous system, as fits of passion, or strong mental excitement. A fit of it is generally preceded by an uneasy sensation, or even a pain, underneath the breastbone; and, what is certainly very extraordinary, there is, before the blood comes up, a taste in the mouth like that of blood; then there is a tickling in the larynx which excites cough, and with the cough a quantity of florid blood is expectorated.

In some instances, the attack is accompanied by pretty severe febrile symptoms.

When blood issues from the mouth, it is sometimes a difficult matter to decide as to whether it proceeds from the lungs or stomach. Hæmatemesis is usually preceded by nausea, hæmoptysis not; hæmoptysis is commonly preceded by pain under the sternum and tickling in the larynx, hæmatemesis not; and, while in copious spitting of blood there is usually several successive mouthfuls, in vomiting of it the quantity of blood excreted by the stomach is ejected in one full access of vomiting.

When hæmoptysis occurs, it is generally admitted that the bleeding should be stopped as soon as possible, "not, however, merely by *suppressing* it, but by relieving the necessity on which it depends. The longer it is suffered to continue, the more likely is it to add to the damage which, in too many cases, exists in the lungs." Often there is a decided febrile movement accompanying the hæmorrhage, as indicated by the increased heat of the surface, the excited action of the heart, and the quick and bounding pulse. In this case, an antiphlogistic plan of treatment is clearly indicated. The patient must be surrounded with cool fresh air, his head and shoulders being raised higher than the rest of his body; his diet must be most meagre, and he must be forbidden speech and motion; and, if it is thought that he can bear it, he must be bled. When the fever is abated, or if there has never been any, along with the rest and the avoidance of motion and unnecessary speech, astringents are prescribed. Of these, the best is, perhaps, the acetate of lead combined with opium. In milder cases, the mineral acids, particularly the sulphuric, are often found very useful.

HÆMORRHAGE IN GENERAL.—There are two kinds of hæmorrhage, each of which may take place from almost every part of the human frame. The one of these occurs whenever a large artery or vein is physically damaged, and principally belongs to the surgeon, although cases of this kind of bleeding occasionally come under the notice of the physician, in consequence of ulceration corroding through the coats of such bloodvessels. But the hæmorrhage that comes generally and peculiarly under the cognizance of the physician is the second kind of it, which consists in a morbid exhalation, generally from mucous surfaces, of blood, without there being any breach of structure. In the general opinion, indeed, these internal hæmorrhages are classed among the surgical kind, and when they occur, it is usual

to say that a bloodvessel has been burst. This, however, although the blood is plentifully, and, in many cases, rapidly poured out, does not happen, except as a very rare exception. The only exception to this rule occurs in the brain, and cerebral hæmorrhage, with apoplexy and its other consequences, almost always depends upon the rupture of a bloodvessel.

This medical hæmorrhage, as it has been called, is referred to *exhalation*; that is to say, the blood is held to be poured, in these morbid states, through the pores in the sides of the capillary vessels, through which pores, in the healthy condition of the capillaries and the blood, the blood corpuscles cannot pass.

Hæmorrhages often come on from time to time, especially from the nose of young and robust people, and scarcely deserve the name of disease, inasmuch as, so far from being connected with ill health, they certainly appear to promote the general tone of the system, and, if violently suppressed, as by the application of cold, &c., dangerous results often follow.

Hæmorrhages sometimes come on idiopathically, and then very much resemble inflammation, only instead of the fluid excreted at the inflamed parts being first serum and then lymph, &c., the whole mass of the blood exudes. At other times the tendency to hæmorrhage appears to be decidedly connected with a diseased state of the blood, altogether different from an inflammatory condition.—See 'Scurvy' and 'Purpura.'

But, in general, these exhalations of blood depend upon local congestions, and are symptomatic of some disease, usually of an organic nature, in some organs which the veins of the part from which the exhalation takes place have an intimate connection with. Thus, the most frequent of all hæmorrhages, hæmoptysis—see 'Hæmoptysis'—comes on in consequence of the deposition of tubercular matter in the substance of the lungs.

It is easy to conceive that hæmorrhage may sometimes be a very serious disease, and at others one of little importance. It may discharge the blood so abundantly, that the patient will sink from syncope; or the blood extravasated may injuriously press upon neighbouring parts, as happens in the brain, &c., or it may choke the sufferer; or it, from its repeated occurrence, may gradually enfeeble and debilitate its victim.

Hæmorrhage being thus merely a symptom of many diseased states, its treatment is, in different instances of it, very various. In those cases of it that occur from the nose, &c., of robust individuals, the flow of blood is rather to be encouraged than stopped; while in the others it is often desirable to check the escape of blood as much as possible, partly with the view of preventing the patient from losing strength, and partly with the hope of preventing the injurious pressure of the effused blood

upon neighbouring organs. To this end, the patient is kept in a state of absolute quiet, and is surrounded, as much as possible, by cool and fresh air. If much fever be present, the danger consequent upon the excited state of the circulation is relieved by general and local bleeding. Then, in passive, or moderately passive cases, astringents are used. Of these the application of cold is very important, and it may be applied to the neighbourhood of the part from whence the bleeding proceeds, by means of ice or cold water, and the former of these substances may be swallowed in bits. Some bleedings, indeed, may be arrested by the application of cold to a distant part, of which, perhaps, the best instance is the familiar one, of stopping bleeding from the nose by suddenly putting a cold key down the back, between the clothes and the skin. Of the astringent drugs, perhaps the most useful is the acetate of lead. Gallic acid, and the vegetables that contain it, nitre, the mineral acids, the tincture of muriate of iron, alum, oil of turpentine, and many other substances, have often been found very useful. Few hæmorrhages, too, of any standing, can be successfully treated without opium, which allays the excited state of the circulation so often witnessed in this class of diseases.

Hæmorrhage from the Intestines.—This disease was formerly called *Melæna*, from a word that signifies *black*, owing to the extravasated blood being rendered so black by the gastric juice, that it was mistaken by the ancients for *black bile*. The pathology of the disease is exactly analogous to hæmatemesis, but the effusion takes place from a lower part of the intestinal canal than the stomach, and is therefore not vomited. The general plan of treatment is likewise the same as in bleeding from the stomach.

Hæmorrhage from the Nose.—The technical name of this affection is *Epistaxis*. It is, in general, a very harmless affair. The readiness with which the mucous membrane lining the nose exudes blood from a slight blow, a fit of sneezing, severe exercise, and the like, in the young and robust, is a very familiar fact.

Sometimes, however, it comes on in advanced life, and is then a symptom that there is a morbid congested condition of the veins of the head, indicative either of disease of the heart, or of a threatened fit of apoplexy. In such a case, the bleeding must either be promoted, or other means of depletion substituted in its place.

Common cases of bleeding from the nose, when they become excessive, and do not yield to the application of cold, generally stop if the nostrils are well plugged with bits of linen rag dipped in cold water. A plan that looks very problematical and empirical, but which is said to be effectual, consists in making the patient raise one or both of his arms above his head, and to keep them in that position for a few minutes.

HAIR.—The skin of mammals, as the head of the human species, is covered by hairs. Each hair consists of a delicate process of a gelatinous or horny substance, which grows from a bulb situated in or beneath the skin. This bulb consists of a small cone-shaped body, which is composed of blood-vessels and nerves. It is on the surface of this bulb that the substance of the hair is secreted, and this is deposited, as in the case of the nails, by successive layers, which are continuously forming and pushing forward the layers that have been so deposited before them.

The hairs of man are not perfectly round, although the degree of their flatness varies a good deal. These flattened hairs may always be distinguished by their propensity to curl, and the hair constituting the *beard* of almost all men is very considerably flattened. In most of the races of mankind, the hair of the head is nearly round; but, as every one knows, there are many individuals, even of this country, in whom the hair of the head is naturally curled. The hair of Africans is almost invariably so, and such have been compared to the hair or wool of sheep. This, however, is not accurate, for the hair of a sheep is perfectly round; and although it is curly, is not, like the human hair, spirally so, but has its waves or curls in the same plane, and can, therefore, be readily spun.

Hair is a very elastic substance, and will stretch to one-third of its length, and then resume its former extent. It conducts heat badly, owing to the quantity of air contained in its interstices. It is, too, remarkably hygrometric, attracting and retaining moisture, in consequence of which it becomes flaccid and elongated, and is hence used in making hygrometers.

In chemical constitution, hair is almost entirely gelatine. The hair itself, apart from the bulb, has no nerves, and therefore no sensation.

Hair is liable to a good many diseases, but they have been little studied. In the first place, they are liable to die, producing the state called *baldness*. This falling off of the hair, once or twice a year, appears normal in animals, but in their case it is immediately replaced by fresh hair. It comes on in man, however, in consequence of various febrile diseases, and perhaps in consequence of severe mental exertion, and a part once bald seldom becomes covered with hair again. Then the change of colour that takes place in hair is very remarkable. Usually, but at very different ages, the hair of middle and after life becomes more or less grey or white; but there appear to be authenticated cases in which, under the influence of mental emotion, this change of colour has taken place with extreme rapidity. The change of colour is attributed to the deficient secretion of the colouring oil secreted by the bulb; but how the hair that is already coloured should, in a few hours, lose its tinge, is perfectly inexplicable.

cable. The most remarkable disease of the hair, however, is that endemic among the inhabitants of Poland, called *plica polonensis*.—See 'Plica polonensis.'

HAIR WORM.—See 'Guinea Worm.'

HARE.—This animal is in very common request as an article of food. Unlike almost every other animal, it is not bled, and consequently the whole of its blood is contained in its roasted flesh, or in the soup made from it. This blood is immediately turned black by the action of the gastric juice, and if vomiting come on soon after partaking of these dishes, it may be mistaken for hæmatemesis—see 'Hæmatemesis'—and this darkened blood of the hare is perhaps not uncommonly mistaken for hæmorrhage from the intestines.

HARTSHORN.—This is the horn of the common stag, and has a place in the pharmacopœia. The horn of this animal differs in composition from those of the other animals, which are mainly composed of coagulated albumen, whereas hartshorn is like bone, save that it contains more gelatine. It is kept in the shops in the form of raspings, which, when boiled in water, yield a jelly, formerly often given to convalescents, and also in intestinal and pulmonary irritations. It is now almost entirely superseded by calf-foot jelly.

It is also used for clearing liquids, being cheaper than isinglass, which is, however, superior for this purpose.

HARTSHORN, SPIRIT OF.—Ammonia was formerly prepared by exposing deers' horns to destructive distillation, and was hence called spirit of hartshorn. It is now made from bones and animal refuse.—See 'Ammonia.'

HARROWGATE WATER.—This mineral water is the most important of the British sulphureous or hepatic springs. It contains, besides sulphur, &c., a considerable quantity of sulphuretted hydrogen, which gives to it a very fetid and offensive smell, and an exceedingly nauseous taste.

Harrowgate water is a stimulating purgative, and is believed to possess some specific action upon the skin. It is employed externally and internally in chronic diseases of the skin, and in chronic rheumatism. It is also taken by an immense number of people who are quite well,

HAY ASTHMA.—This disease, or hay fever, as it is often named, consists of an excessive irritation of the eyes, nose, and air passages. First of all, there is great itching in these parts, then violent fits of sneezing, with great discharge from the nostrils, followed by cough and difficulty of breathing. It only attacks certain persons, and only them at one season of the year, namely, about June, when the grass is in flower, or haymaking going on. These individuals, too, escape the disease, if they avoid going into the meadows and hayfields. The susceptibility of some people to take this affection is most

extraordinary. This is the case of one lady on record, who had a paroxysm brought on by the approach of her children who had been in a hayfield; and upon another occasion, when she had gone to the country during hay-time, she was suddenly attacked by the disease, she at the time believing no hay was in the neighbourhood. It was discovered, however, that there was a field at the top of a cliff, near the base of which she had been walking. Upon another occasion she was suddenly attacked, and it was found that a haystack was building near her house, the hay having been brought from a field five miles distant.

It is conjectured that the aroma of the *Anthroxanthum odoratum*, a sweet-scented vernal grass, is the exciting cause of the complaint.

Various plans of treatment have been proposed, all perhaps equally useless. Diffusing chlorine through the room, upon the whole, seems most serviceable.

In individuals of peculiar idiosyncrasy, other odours besides that of hay bring on a similar complaint.

HAZEL NUT.—This only differs from a filbert in being smaller, and having a short husk.

HEADACHE.—This is perhaps the most frequent malady that the human frame is subject to. It arises from so many causes, and is dependent on so great a number of morbid conditions of other parts of the body, that it is, perhaps, of all diseases, the most difficult to treat. In this article we do not include headache as one of the symptoms of fever, or other acute disease, or a pain in the head arising from disease of the brain, or its envelopes; but we consider those cases of the affections where the seat of the pain is the scalp, where the ache is the principal and prominent symptom, and where no structural lesion is present.

Headache, then, is always more or less of a neuralgic character, and, like all other nervous diseases, is more frequent among individuals of a nervous temperament. It is, therefore, more common among women than among men; among those of a listless, sedentary habit, than those who are busy and take exercise; and among those of a shattered constitution, than the robust. Too much mental exercise, long-continued anxiety, mental depression, an insufficient and innutritious diet, and many similar causes, powerfully predispose to it. The exciting causes are almost innumerable; among them may be placed a sudden mental impression, any depressing passion, an error in diet, too little sleep, stooping the head, inordinate mental application, sudden changes of the weather, and inspiration of impure air.

The pain, in different cases, is very variable as to its site and nature. Sometimes one half of the scalp only is affected, and the disease is then termed *hemisrania*, a word that, by a curious process of

transmutation, has got corrupted into megrim. At other times, and in this case, the pain is usually very intense; the pain is confined to one small spot that could be covered by a finger; and upon other occasions it becomes very decidedly neuralgic, and follows the course of particular nerves. The pain is described in different cases as dull, compressive, acute, lacerating, bursting, gnawing, &c. Sometimes it comes in violent throbs or stounds, and sometimes, particularly in those cases in which the pain is confined to one small spot, the sensation complained of is as of a nail being driven into the head. Headache, upon some occasions, is distinctly intermittent.

The treatment of this affection is as protean as its nature and symptoms. When it is clearly connected with disorder of the stomach, it is often decidedly relieved by alkalies and rhubarb; when it has been induced by exhaustion, a stimulant may often remove it; when it intermits, quinine should be given; and when it is of that kind when the pain is very intense, but localised, preparations of iron and valerian are often efficacious. In all cases it is of importance to improve the general health.

HEARING.—By means of the sense of hearing, we become acquainted with the vibrations that are taking place in bodies around us. These vibrations are communicated to the air, which is thrown into a state of undulation; and when these impinge upon the extremity of a special or auditory nerve, the consequent sensation is felt in the brain. In the lower animals, all that is necessary for this purpose is a cavity, covered by a membrane and filled with fluid, and in which is the termination of the auditory nerve. In man, and the higher animals, the apparatus is much more complex; and the ears are so constructed as to transmit the true vibrations of the air in such a manner to the membrane, that the sonorous vibrations excited in it may be much more powerful than they otherwise would be.

The human ear is represented in Plate XIII., fig. 38.

HEART, DISEASES OF.—Diseases of the heart were formerly thought to be of rare occurrence, and were very generally considered to be pulmonary affections. Since the introduction of the stethoscope, however, it has, unfortunately, been ascertained that they are of very common occurrence, and productive (generally indirectly, however,) of a great deal of mortality.

It is very seldom that the whole heart is diseased. Sometimes its lining, at others its investing membrane, only is affected; sometimes its valves, and sometimes its walls.

A very frequent disease of the heart is increase of its muscular structure, or hypertrophy, as it is technically called. This is always caused by some obstruction to the flow of the blood, to counteract which, the heart has to contract more forcibly; and,

therefore, just as a blacksmith's arm becomes by its exercise increased in bulk, does the muscular structure of one or more of the chambers of the heart become enlarged.

A person affected with hypertrophy of the heart, has a sensation of increased fullness of its contractions, and, as he lies awake in bed, he hears his heart beating. Upon placing the hand over the heart, a "steady, swelling, uncontrollable impulsion" is felt; the sounds of the heart are natural, or nearly so; the pulse is regular, no difficulty of breathing is complained of, nor is there any dropsy; the circulation is excited, and there is a hard pulse, tendency to headache, bleeding from the nose, and other indications of congestion.

The treatment of hypertrophy consists in quiet, abstinence, the antiphlogistic regimen, and repeated small bleedings.

Sometimes a chamber, and this is especially the case with the right ventricle, is dilated without any increase of muscular thickness. This is generally in consequence of long-standing pulmonary disease, which has prevented the easy passage of the blood out of the right ventricle. In this affection there is usually great dilatation of the jugular veins, the heart's action is fluttering, the pulse is irregular, the breathing short and laboured, and the countenance, owing to the quantity of venous blood congested in it, very dusky, and, sooner or later, from the same congestion of blood in the veins, dropsy is pretty sure to come on.

This is a very difficult disease to treat. Perfect rest and quiet must be enjoined, and every possible precaution taken against the invasion of the dropsy. This may, to some extent at least, be done by administering diaphoretics and diuretics.

Occasionally, but rarely, the parietes become thinner and thinner, and at last burst. George II. died from this cause.

Diseases of the valves of the heart are, unfortunately, too common. Those of the left side are more frequently affected than those on the right. They lose their pliancy, and become thickened, generally from lymph being deposited in them, owing to an inflammatory attack. They are also liable to a perversion of nutrition, by which they become ossified, or converted partially or entirely into bone.

By attending to the sounds of the heart in these cases, it is generally not difficult to decide as to which valve is affected. Unluckily, we can do nothing to cure these morbid conditions. By rest, &c., and by moderate bleedings in paroxysms of difficult breathing, we can palliate.

Another disease of the heart is inflammation of the heart-purse, or pericardium.—See 'Pericarditis.'

In almost all these very serious affections of the heart there is palpitation. But palpitations of the heart are very common in nervous and dyspeptic

people, and when they occur only occasionally, they may almost invariably be regarded as of no moment.

HEARTBURN.—This is one of the many symptoms of dyspepsia. It consists of an uneasy burning sensation, extending down the gullet to, as it were, the heart. It undoubtedly depends upon a quantity of acid—sometimes, perhaps, the lactic or acetic, but usually the muriatic—in the stomach. Sometimes the heartburn comes on about four hours after having taken a meal, and in this case probably depends upon the food having passed into the duodenum, leaving a quantity of acid, that has been secreted in excess for the purpose of dissolving the food, in the stomach. This form may be treated by neutralizing the acid by an alkali, or prevented by administering an alkaline draught before partaking of a meal.

Another form of heartburn comes on immediately after taking food. When this occurs *habitually*, we may infer an inflammatory, or a very irritable, state of the mucous membrane of the stomach. The treatment of this consists in a very mild diet, counter-irritation, and the judicious use of opiates.

Another, and very common form of heartburn, occurs quite independently of taking food, and comes on when the stomach is quite empty, and is, indeed, generally relieved by taking food. It is sometimes dependent upon some morbid acrimony of the secretions of the stomach, but would certainly sometimes appear to be caused by a distension of the stomach from flatulence. It generally yields to antacids, often combined with a little stimulant.

HEAT.—Excessive heat has long been recognized as a cause of disease. The most remarkable power that it possesses is that of increasing the activity of the functions of the liver. It not only increases the quantity of bile that is secreted, but it causes an alteration in the properties of that fluid. Thus, every year, in this country, during very sultry weather, we have an epidemic of vomiting, and intestinal derangements; and, in hotter countries, this is still more marked, and often also the liver becomes inflamed, and the inflammation goes on to the formation of large abscesses. Frequently these hepatic derangements become chronic, and the yellow complexion of so many Europeans, who have lived long in tropical countries, is an indication of chronic disorder of the biliary functions, produced by exposure to excessive heat.

Heat, in a still more excessive degree, has other evil influences. It is liable to produce that variety of concussion of the brain called *coup de soleil*. This disorder often attacks Europeans exposed to the direct rays of the sun in tropical climates, and those affected with it drop down in a state of insensibility, as if struck by apoplexy. Sometimes, indeed, it would seem to be apoplexy, and the struck person dies; but, in general, it would appear to be like a simple concussion, without any rupture of a bloodvessel.

The practice that is found to answer best for this *coup de soleil* among our troops in India, is the immediate administration of a stimulant, as rum and water.

Excessive heat, too, tends to excite cutaneous diseases.

HECTIC FEVER.—See 'Fever.'

HELLEBORE, BLACK, or Christmas rose, is figured in Plate XXIV. The root of this plant has been used from the earliest historical periods of medicine, and it was the favourite cathartic of Hippocrates. The plant is a native of the middle and south of Europe. The root is exported to this country from Marseilles and Hamburg. It is a very drastic purgative, and was long used as such in head affections, but it is now much less employed, croton oil being substituted for it. It was also formerly thought efficacious in melancholy.

HELLEBORE, WHITE.—This is the *Veratrum album* of botanists. It is a native of the mountainous regions of Europe. The rhizome is the official part of the plant. It is a drug, possessing very violent properties; locally, it is an irritant, and, swallowed, it acts as an emetic and cathartic. It is a good deal analogous in its action to colchicum, and, like that drug, has been given in gout. The powdered rhizome is used as a stimulatory, and is an ingredient in the German snuff called *Schneeberger*.

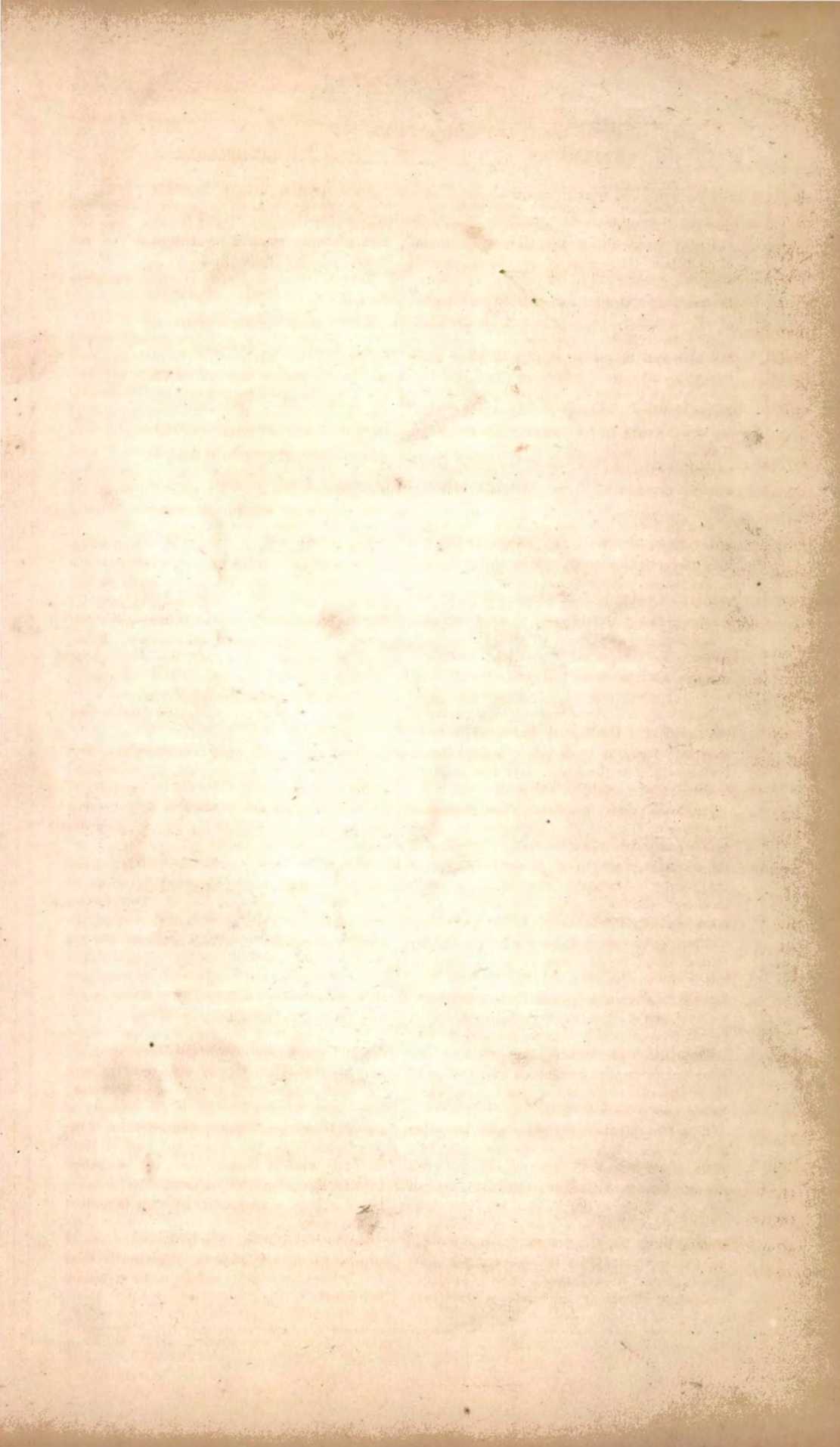
HEMICRANIA.—See 'Headache.'

HEMIPLEGIA.—After an attack of apoplexy, there is usually more or less paralysis. In many cases, indeed almost always, either all or a portion of the voluntary muscles of one side only are thus palsied; and when this is the case, we have the disease in question—hemiplegia.

In hemiplegia, all the voluntary muscles of one side of the body may be completely powerless, or only one set of muscles, as those of a limb, for instance, are so affected; or, as in slighter cases, the muscles may only be partially paralyzed, and the affected person can trail his leg, or slightly raise his arm—in fact, there is in hemiplegia every possible gradation, from a feeling of weakness in the affected muscles, to complete immobility.

In consequence of the muscles of the tongue being affected, there is often in this disease difficulty, or even complete inability, of uttering words, and this quite independently of any mental affections. Very often, however—indeed in the majority of cases of hemiplegia—there is some alteration of the mental faculties. The degree and kind of these vary very much in different cases; but two symptoms are almost invariably present, more or less—loss of memory, and a peculiar tendency to weep at trifling causes.

Besides the paralysis, there is sometimes loss of sensibility in the affected parts. Occasionally, there is only loss of sensibility, and the power of motion is retained.





CONIUM MACULATUM
COMMON HEMLOCK



HELLEBORUS NIGER
BLACK HELLEBORE



NICOTIANA TABACUM
VIRGINIAN TOBACCO

The circulation in a palsied limb is feebler than the other parts of the body, and the power of generating heat in it consequently less.

At the outset of a case of hemiplegia, the treatment is entirely directed to the apoplexy that causes it. See 'Apoplexy.' When the disease becomes chronic, the affected parts—which, on account of their low power of generating heat, must be kept wrapt in flannel—are gently rubbed every day, either with a flesh brush, or with stimulating liniments. If, as sometimes is the case, a good deal of pain is complained of, opiates should be prescribed. But when the disease has fairly become chronic, nothing is so likely to do good as the exhibition of strychnia—See 'Strychnia.'

HEMLOCK.—This plant is figured in Plate XXIV. It is supposed to be *venios*, or state poison of the Athenians, by which Socrates died. It is used to relieve pain, and also, in smaller doses, as an alterative in glandular and visceral enlargements.

HEMP.—This is the fibre obtained from the *Cannabis sativa*, a plant very much resembling the common nettle. It also possesses powerfully narcotic properties, and the Orientals take advantage of this to obtain an intoxicating drug. They powder its leaves, infuse them along with an aromatic, and drink the compound, which is called *bang*. A state of ecstatic drowsiness is produced, which bang-eaters maintain is more delightful than that which follows the use of opium. They also smoke it.

HENBANE.—This indigenous plant is the *Hyoscyamus niger* of botanists. Both its seeds and leaves are used in medicine. They have a very soothing and sedative effect, and as they neither produce constipation nor headache, they are often used in place of opium. They form, too, a very useful adjunct to purgative mixtures and pills.

HENRY'S AROMATIC VINEGAR.—This is very much used—applied to the nose to prevent fainting. It is a solution of camphor and oil of cloves, rosemary, and lavender, in strong acetic acid.

HEPATITIS, or inflammation of the liver, is not a very frequent disease in this country. In the acute form of it, there is the usual fever of inflammation, pain in the right side, inability to lie upon the left, difficulty of breathing, a dry cough, and often vomiting and hiccup. The pain usually extends up to the right shoulder. Occasionally, there is jaundice.

Acute hepatitis may end in resolution, or it may go on into the chronic form, or it may terminate in suppuration. When this last is the case, the matter is usually collected into abscesses. These sometimes burst into the cavity of the abdomen, and are then almost uniformly fatal; but, more generally, they approach the surface, and as they do, adhesion takes place between the inflamed organ and the neighbouring parts; and in this way

the pus, instead of getting into the peritoneum and exciting fatal inflammation there, comes out at the surface.

The treatment consists in free bleeding, the antiphlogistic regimen, the abundant exhibition of saline purgatives (to deplete the portal vessels), and counter-irritation.

Chronic hepatitis is characterized by pain in the region of the liver, disorder of the biliary functions, and, in general, much languor and depression of spirits. Very often, too, the liver becomes enlarged, although sometimes it shrinks. The treatment consists in applying counter-irritants, administering saline purgatives, iodine, and dandelion. It is usual to combine blue pill in the purgative part of the treatment.

A very great many of the cases called chronic hepatitis are merely instances of dyspepsia, combined with hypochondriasis, and the liver is no ways affected.

HERB BENNET.—This is the *Geum urbanum*. The root is an aromatic tonic. It is also sometimes put into ale.

HEREDITARY TENDENCY OF DISEASE.—The tendency to take certain diseases is undoubtedly transmitted from parents to their offspring. The most important of these are gout, insanity, scrofula, and asthma.

HERMODACTYLUS.—The cornus of a plant of this name were very much employed by the later Greek and the Arabian physicians in rheumatism. It is confidently asserted by one of them, that the drug can, although it produces great nausea, cure rheumatism in two days.

HERPES.—This is the name of a non-contagious vesicular skin disease. It consists of red patches, upon each of which the vesicles stand. One of the most remarkable forms of it is called *herpes zoster*, or *shingles*, and in it the patches lie in the direction of a band that go just half round the body. Generally it begins at the middle of the breastbone, and goes round to the centre of the backbone. Almost always, too, it is the right half of the body that is affected. The zone or girdle rarely extends beyond the median line, either before or behind, even by ever so little; but it is sometimes said (probably incorrectly) to have completed the circuit of the body, and such instances are reported to have been invariably fatal.

Occasionally, but not often, the shingles are preceded by a violent pain in the chest. The eruption lasts about a fortnight, and if the vesicles and crusts are rubbed off, very troublesome ulceration is apt to be produced.

The treatment consists in warning the patient not to rub off the crusts, and in attending to the general health.

HIRUDO.—See 'Leech.'

HOFFMAN'S ANODYNE.—An imitation of this is

official, and kept in the shops under the name of compound spirit of sulphuric æther. It is a mixture of sulphuric æther, spirit, and ethereal oil. Besides being stimulant and antispasmodic, it is supposed to possess anodyne properties, and to be remarkably useful in those cases of nervous irritation characterized by want of sleep.

HOG.—The flesh of the hog is considered rather slow of digestion, but is very extensively employed, both fresh and salted, and must, therefore, be found not very objectionable in this respect. The fat of the pig, or axunge, is very extensively employed in pharmacy, as the basis of ointments.

HOLLANDS.—See 'Gin.'

HOMBERG'S PYROPHORUS.—This is prepared by calcining alum with charcoal, or some other carbonaceous substance. It is spontaneously inflammable.

HOMŒOPATHY.—The homœopathic plan of treating disease consists in administering a medicine or drug, which is believed to be capable of producing a disease similar to the one that it is desirable to cure. The motto of the party that advocate this plan of therapeutics is, *Similia similibus curantur*, Like are cured by like; and the name of their theory—homœopathy—is derived from the two Greek words, *ὁμοιος*, similar, and *πάθος*, a disease.

The propounder of this system was Hahnemann, who promulgated his views about the beginning of the present century. He maintained, however, that, in the list of recorded cases as stated by physicians of almost all ages, instances might be obtained which went to prove that practice upon these principles, although not avowed, had been successfully followed in all ages. Thus, he said, Hippocrates cured a patient of cholera by administering hellebore, which produces symptoms analogous to those of cholera; the English sweating sickness of 1485 was only successfully treated by sudorifics. Ipecacuanha is useful in dysentery and in asthma, because it excites these diseases; and so on for many other examples.

The answer to all this is very plain. A purgative cures a cholera, not because it tends to excite a cholera, but because it removes the real cause of the cholera from the system; a disease that ends in a critical perspiration, is assisted in this favourable termination by the administration of a sudorific, and so on. But, on the other hand, in those cases that cannot be thus explained, there is no evidence that we could relieve the disease by administering these remedies in usual or full doses; and there is every probability, nay, even certainty, that we would very materially aggravate the disease by acting in such a manner.

So reasonable and notorious is this, that homœopathy would probably have convinced every one of its folly, and died a natural death, had not its founder administered his remedies in doses so very

small, that they cannot, according to the experience of the profession from the time of Hippocrates downwards, have any therapeutical, or, indeed, any effect whatever. Substances, for instance, that have always been given in drachms or ounces, are used by the homœopaths in decillionths, billionths, and quadrillionths of a grain. Thus, common doses employed by the homœopaths of the adjoining very common drugs are as follow:—

Charcoal,...One or two decillionths of a grain.

Camomile,...Two quadrillionths of a grain.

Nutmeg,...Two millionths of a grain.

Opium,... { Two decillionths of a drop of spirituous solution.

Ipecacuanha, Two or three millionths of a grain.

The manner in which these small doses are obtained is curious. If the substance be a solid, one grain of it is powdered, and mixed with ninety-nine grains of sugar of milk (a substance that the homœopaths consider has no therapeutical action), this constitutes the first attenuation; one grain of this is mixed with ninety-nine grains more sugar, and this constitutes the second attenuation; a grain of this is mixed with ninety-nine more grains of sugar, forming the third attenuation; and so on, in some cases for thirty times.

The following table shows the strength of the different attenuations, with the signs that the homœopaths use to designate them:—

Sign.	Strength of One Grain.
1.....First attenuation,	{ One hundredth part of a grain.
2.....Second,.....	One thousandth.
I.....Third,.....	One millionth.
II.....Sixth,.....	One billionth.
III.....Ninth,.....	One trillionth.
IV.....Twelfth,.....	One quadrillionth.
V.....Fifteenth,.....	One quintillionth.
VI.....Eighteenth,.....	One sextillionth.
VII.....Twenty-first,.....	One septillionth.
VIII.....Twenty-fourth,.....	One octillionth.
IX.....Twenty-seventh,.....	One nonillionth.
X.....Thirtieth,.....	One decillionth.

The subject of homœopathy is fully discussed in the body of the work. We can here only recapitulate four of the arguments, relative to its futility, that are very obvious.

1st. Some of the best and most undoubted remedies are certainly not homœopathic. For example, periodic diseases are cured by bark, while bark never excited in either a healthy or diseased man a periodic complaint. Sulphur unquestionably cures the itch, but it never produced it. Vegetables in a fresh state cure the scurvy, but never bring on that complaint; and so on for a great many others.

2d. It is quite well known, by all conversant with the actual treatment of disease, that if medi-

cines that really could produce a state analogous to that existing in many diseases were exhibited in anything like full and effectual doses, the consequences would be most mischievous. If, for instance, we gave to a man labouring under curable coma a couple of grains of opium, he would never speak more; or if we gave an ordinary dose of arsenic to one labouring under gastritis, we would kill him.

3d. The quantities of drugs prescribed by the homœopaths are so small, that they are not appreciable to the senses, nor cognizable to chemical tests. Hence there is reason to believe that they are of no effect at all, and that, when a patient treated according to homœopathy recovers, he does so in spite of that system, and by the spontaneous effects of nature.

4th. Homœopathy has been, more than once, fairly put to the test of experiment by men in the habit of deciding upon the action of remedies, and the result has uniformly been a complete failure.

HONEY.—This substance is secreted by the nectaries of flowers, and is collected by the working or neuter bees, who lap it, and then pass it into a pouch of their œsophagus, named the honey-bag. When an insect, with his honey-bag replenished, arrives at the hive, it disgorges it, and stores it up for future use.

Honey varies very much in its flavour and smell, according to the flowers from which it has been gathered, and also according to the age of the bee that gathers it. Honey from a hive that has never swarmed, or *virgin honey*, as it is called, is the most esteemed. The labiate flowers are said to furnish the finest quality of it. Sometimes it actually acquires poisonous properties, and that of Trebizond is said to induce narcotism. This is said to be owing to the bees feeding on the *Azalea pontica*.

Honey consists of sugar, mixed with wax, and colouring and gummy matters.

As an article of diet, honey is pretty much superseded by cane, maple, and beet-root sugar. In the northern countries, too, beer and corn spirit have quite superseded the fermented honey, or mead, that used to be so favourite a beverage.

As a medicine, honey is still, although not extensively, employed. It is used as a basis for gargles, partly on account of its emollient effect, and partly owing to its taste. It is likewise employed as a vehicle for more powerful substances, to be applied to sore mouths, &c. Mixed with vinegar, it forms a pleasant pectoral in cases of chronic cough.

HOOPING-COUGH.—This is a well-known and remarkable complaint, which almost every one goes through, generally in childhood. An affected child is seized with the symptoms of ordinary cold, or catarrh. This goes on for a fortnight or so, when a peculiar cough begins to develop itself.

This comes on in paroxysms, and it is characterized by having a number of expirations made in it without any corresponding inspiration. These last so long, that the little patient, to use the common expression, gets black (*i.e.*, dusky) in the face, and is like to perish from suffocation. At last, however, an inspiration does take place, but, as the chink of the windpipe is partially closed, it is attended with a peculiar crow, or whoop, which gives name to the disease. As soon as the whoop has taken place, the expirations begin again, and the whole is repeated until the child either vomit or bring up a quantity of mucus. He is then somewhat fatigued, perhaps, but, in other respects, quite well, until the paroxysm comes on again. If the fit have terminated in vomiting, he is, in general, very hungry.

At the time when the whoop first makes its appearance, the expectoration is thin and scanty, but as the disease advances, it becomes more copious and tough.

The disease lasts from three weeks to as many months or longer, but in general its course is run in about six weeks.

There is no doubt of the infectious nature of hooping-cough, and one attack of it exempts from future invasions.

An ordinary case of hooping-cough is not at all dangerous, and if it is not complicated with other diseases of the chest, usually gets well without much interference. Unluckily, however, it is very apt to get mixed up with inflammation of the lungs and emphysema of these organs, produced by the violent paroxysms of coughing. Also, owing to the great interruption that takes place during these paroxysms, to the circulation within the head, various cerebral affections are apt to be induced; of which the most suddenly dangerous is apoplexy, and, but more slowly, hydrocephalus.

These complications are more liable to occur in very young children, and it is among such that the disease generally terminates fatally, and this is particularly the case when the children are of a scrofulous diathesis.

The treatment of hooping-cough consists in avoiding these complications, and if possible, to mitigate the violence of the paroxysms. It does not appear that anything can be done to shorten the duration of the disease. As has been observed, "It will run a certain course, and our business is to conduct it evenly and safely to the end of that course." The child should be put upon a low diet, from which animal food is excluded, and carefully kept from vicissitudes of temperature, and if the digestive organs go out of order, alterative remedies should be employed. Upon some occasions, after the disease has got well, there remains a habitual cough. Change of air, tonic regimen, and cold bathing will generally put an end to this.

Somehow or other there is even more quackery

in nursery diseases than in other complaints; and there are a great many plans of treating whooping-cough followed. The most common is the administration of emetics, which, when the expectoration is scanty and difficult, seems serviceable. But many of the popular modes of managing whooping-cough are extremely dangerous.

HOP.—This is the *humulus lupulus* of botanists. The plant is indigenous in many parts of Europe, and perhaps in Britain. Its culture, however, was introduced into England from Flanders, in the reign of Henry VIII. It is now grown on a large scale in Kent, Sussex, and other counties, for the sake of its aggregate fruits or catkins, which constitute the *hops* of commerce.

These hops consist of scales, nuts, and grains of lupulin, the last being the most important. It contains a peculiar oil, which is narcotic, a bitter principle, and a resin.

Hops possess a fragrant odour, which has a narcotic action. Swallowed, their taste is bitter and aromatic, and they have a soothing and tranquillizing effect, and sometimes act as slight soporifics. A pillow of them is sometimes employed in mania, and other cases characterized by restlessness. This remedy is said to have been successful in the case of George III. They are given internally to allay restlessness and sooth irritation, and also as an anodyne in rheumatism and gout. But by far their principal consumption is in the manufacture of ale and beer. They are supposed (probably without cause) to make the beer keep better, and they communicate an aromatic bitter flavour to it. Part of the soporific effect of beer, too, must be ascribed to their action.

HOREHOUND.—This plant, the *marrubium vulgare*, was formerly in much esteem, but is now never used in regular practice. It is an indigenous plant that is tonic and mildly stimulant. It is used in domestic medicine in chronic colds. Candied horehound ought to consist of the drug and sugar, but opium is very often added, and a nostrum sold in the shops, called *balm of horehound*, contains a large quantity of laudanum and squills, and is a very dangerous thing to have anything to do with.

HORSERADISH.—The *cochlearia armoracia* of botanists. It is an indigenous plant, cultivated in every garden for the sake of its root, which is used both in cookery and medicine. This root has a highly penetrating acrid vapour and a pungent taste. Applied to the skin, it produces vesication; swallowed in large doses (in an infusion), it excites vomiting, and, in smaller doses, is a diuretic. Its properties seem to be owing to a volatile oil. It is used as an adjunct to diuretic mixtures, a compound spirit of it being the preparation usually employed.

HUNGER.—This sensation is probably dependent upon some state of the nerves of the stomach, and,

in a healthy state, is an accurate indication of the wants of the system.

HUXHAM'S TINCTURE OF BARK.—This, or the compound tincture of bark, as it is called, is the best mode of administering cinchona as a tonic and stomachic. It contains, beside the bark, orange peel, serpentary, and saffron.

HYDATID.—This is the name given to parasitic animals, resembling in form a bladder or bag of water, several kinds of which occasionally inhabit the bodies of men and animals.

These disagreeable intruders are divided into two classes—the cephalocysts and acephalocysts, or, those that have heads, and those that are headless. Several of the former have more than one head. They are usually found congregated together within a large cavity or cyst, to which they are attached. They go on sending off buds or young ones, that increase in size and also propagate their kind until, in many cases, they destroy life by pressing upon some important organ.

In the human species, the liver is the most common *habitat* of these animals. It is impossible to tell that they exist there until we see; nor, if we could, is any mode of treatment known. The liver of sheep is particularly liable to the hydatid called *liver fluke*. Another kind of hydatid is occasionally found in the areolar tissue between the muscles. This, however, is rare in man, but not uncommon in the pig, in whom it renders the flesh *measley*. Another parasite inhabits the substance of the muscles of the human body, and there is another that is found in the eye.

It is impossible to account satisfactorily for the origin of these animals. In general, they appear to thrive best when in the frame of an unhealthy and cachectic individual.

HYDRAGYRIUM.—This is the name given to a vesicular skin disease, sometimes produced by the exhibition of mercurial medicines. The disease begins at first without any fever, but there is an eruption upon the thighs of minute vesicles that are very hot and itchy. In severe cases, these extend over a considerable part of the body, and a good deal of fever shows itself. The vesicles increase in size, burst, and pour out a very foetid discharge. The disorder sometimes abates in a fortnight, but it is apt to become obstinate. The antiphlogistic regimen, attention to cleanliness, the warm bath, poultices, and dusting flour over the vesicles are the remedies.

HYDRAGYRUM.—See 'Mercury.'

HYDRATES.—A salt that contains a certain amount of water chemically combined with it, is called a hydrate.

HYDRIODIC ACID.—This acid consists of iodine and hydrogen. It possesses the therapeutical properties of the former substance, and is employed

medicinally. It is not commonly, however, used alone, but combined with potassa.

HYDROCEPHALUS.—This very dangerous disease is best studied under three heads:—1. Acute hydrocephalus; 2. Spurious hydrocephalus; 3. Chronic hydrocephalus.

1. *Acute Hydrocephalus.*—This literally means water in the head, and is a very bad name for the disease, inasmuch as the serous effusion is only an accidental consequence of the disease. It is an acute inflammation of the brain that occurs in children, particularly in those of a scrofulous habit. Various premonitory symptoms often precede an attack of it, and indicate what is about to happen; the child's appetite falls off, or it is morbidly increased, and he is voraciously greedy; all his digestive organs get out of sorts; his temper and disposition change; he becomes heavy, fretful, and uneasy, and often there is a tendency to stagger in his gait. In very young children, the threatening of the disorder is indicated by suddenly awaking from sleep with a scream, clenching of the fists, and a turning in of the thumb towards the palm of the hand.

When some or all of these symptoms occur in a scrofulous child, an attack of hydrocephalus may be apprehended, and every measure should be at once taken to put the child into as good a state of health as possible, in order that it may have the best chance of passing through the ordeal.

A very slight irritation in scrofulous children, manifesting these indications of a disordered nervous system, appears to be able to excite the disease, such as a fall or the irritation of teething. When it fairly manifests itself, it may make its approach in one of three manners.

It may come on very gradually, and this is its usual manner. After a child has exhibited one or all of the premonitory symptoms just mentioned, the pain in the head increases in intensity, and the frequency with which the affected child wakes with a scream, becomes very noticeable. Then very usually vomiting comes on, and there is intolerance of light. Frequently, pain is complained of, not only in the head, but in the limbs; the pulse is quick, and, at the end of a few days, decidedly comatose symptoms make their appearance, and a very peculiar and constant moaning succeeds to the frequent screams.

In the second manner in which hydrocephalus makes its appearance, the premonitory symptoms are not very striking, nor observed for long. There is sudden pain in the head, intolerance of light, flushing of countenance, and often convulsions. There is usually vomiting, almost always brought on by the erect position, and violent fits and screaming, alternating with stupor; these latter being characterized by a dejected and vacant look.

In the third form of attack, neither the premoni-

tory symptoms nor the sudden violence of the febrile accession are well marked, but we are told of the disease in which the brain is involved by the suddenness of the convulsion or paralysis. This form is the most intractable of all to treatment.

In whatever manner the disease makes its invasion, two distinct stages may generally be observed in the progress of hydrocephalus occurring in the acute form.

During the first of these stages, pain in the head is bitterly complained of; the affected child starts from his sleep with screams, and cannot sit or stand up; the head is perceptibly hot; light and noise cause great distress; the child, although unwilling to be disturbed with conversation, is rational; there is much vomiting, the pupils are contracted, and the pulse is frequent. All these symptoms indicate that the inflammation is in its access, and congestive.

The second stage is that of collapse. The pulse in it becomes fluctuating and slow, the pupils dilate, the senses become obtuse, the vision imperfect, and very commonly squinting comes on, the eyes, in the majority of cases, turning inwards. Noises, too, cease to annoy the child, convulsions come on, and he often picks incessantly at his lips or nose. This state may last for a week or two, and, during it, very remarkable improvements for the better come on from time to time, the little patient recovering his senses, but these are very apt to be but temporary. These only apparent appearances of amendment may come on more than once. In fatal cases, the pulse usually again becomes frequent, so frequent, indeed, that it cannot be counted; the child rolls moaning from side to side; and, at length, after a period varying from a few hours to a fortnight from the time when the pulse again becomes rapid, expires.

Upon examining the brain of a child, dead of the acute hydrocephalus, there is every mark of severe inflammation of the brain and its membranes; and very often scrofulous tubercles are found in it.

Although an intractable disease, acute hydrocephalus is one that may be brought to a successful termination. Of every three cases, perhaps, one may be saved; and this salvation depends on using antiphlogistic remedies from a very early period. Of these, if the state of the circulation will permit, the foremost is blood-letting, and perhaps the best mode is to take it by the lancet, and not by leeches. Next, and almost equal to this, is the use of purgatives, which not only diminish the force of the circulation, but act as derivatives from the head. The purgatives usually employed are calomel, jalap, and scammony. The quantity of these drugs that is beneficially borne in cases of hydrocephalus, is sometimes enormous. The hair should be removed from the head, and cloths dipped in cold lotions

kept continually applied to the scalp, while the feet should be kept warm by means of flannel and the like. In the second stage of the disease, blisters may be applied.

2. *Spurious Hydrocephalus*.—Weakly and delicate children are liable to a disease, not at all of an inflammatory nature, and requiring a very different treatment from that just mentioned, but which, to a careless observer, looks very like the hydrocephalus.

The child affected with this spurious hydrocephalus, as it has been called, has almost invariably been suffering from exhausting diarrhoea, very often consequent upon weaning; listlessness comes on; the child will not raise its head, but the face is pale, the cheeks cool, the pulse feeble, and the distinctive characters of the true hydrocephalus narrated above are observed. This spurious hydrocephalus requires stimulants and a nutritious diet.

3. *Chronic Hydrocephalus*.—This disease has no connection with the acute hydrocephalus, nor, indeed, with inflammation at all. On the contrary, it is a peculiar kind of dropsy. A watery fluid (from some unascertained cause) collects within the skull in children before the bones have become solid. The brain-case yields to the pressure, the size of the head is very much increased, and, owing to the disturbance to the brain, the cerebral functions are generally soon very much deranged.

In consequence of the pressure, the bones of the skull, while they get thinner, enclose a much larger space, and the head attains an enormous size. As the bones of the child's face, however, only increase in the usual manner, a very peculiar and unpleasant kind of physiognomy characterizes the unfortunate children affected with this disease. Sometimes, indeed, the head becomes so enlarged and heavy, that the sufferer is obliged to support it with his hands.

In the great majority of cases of this affection, the mental functions suffer, and very usually there is blindness or palsy.

Chronic hydrocephalus is very unamenable to treatment. Its cure, however, may be attempted by internal medicines, and also surgically.

Of the internal remedies, the most hope is to be expected from the exhibition of diuretics, purgatives, iodine, and mercury; and of these, the last is perhaps most trusted to.

The external ones are binding the head and tapping.

HYDROCHLORIC ACID.—This was formerly called *marine acid*, or *muriatic acid*. In its liquid form it was known to Geber. It is now prepared by the action of sulphuric acid upon chloride of sodium. It is a gas, but, as found in the laboratory is always mixed with water.

In medicinal doses, hydrochloric acid is tonic, refrigerant, and diuretic. It is not very much used.

HYDROCYANIC ACID.—The substance called *Prussian blue* was discovered about a century and a half ago. It was not, however, until 1782 that Scheele obtained *prussic acid*, as it was then called, from it. Afterwards it was discovered in laurel water. It has received the name of hydrocyanic, because it is composed of hydrogen and cyanogen.

The hydrocyanic or prussic acid of the shops, only contains about two per cent. of real acid, the remaining ninety-eight being water. Nevertheless, it is one of the most violent and concentrated poisons that we possess. Taken even in inconsiderable quantities, death takes place instantaneously; and it appears to have a powerful paralyzing effect upon the brain and spinal cord. Notwithstanding this energy of its action, it has not proved therapeutically of that use which at one time it was hoped it would. It is given in cases of dyspepsia attended with much pain, and sometimes for the purpose of relieving the cough in phthisis, &c.

HYDROGEN.—This is one of the chemical elements, and very extensively diffused in nature, constituting, as it does, eleven per cent. by weight of water. It is a colourless, tasteless, and inodorous gas. It has been proposed to inhale it in pulmonary consumption, and a solution of it in water has been recommended in diabetes.

HYDROMETER.—This is an instrument to estimate the quantity of alcohol contained in a fluid. That employed in this country, in the collection of the excise duties, is called Sykes' hydrometer. Spirit that has the specific gravity of 0.920, the thermometer being at 60°, is called proof spirit; that which is heavier is said to be under proof; and that which is lighter (and contains consequently more alcohol) is said to be over-proof.

The hydrometer is merely an instrument for taking specific gravities, with the proportion of alcohol indicated against each part of the scale.

The origin of the term *proof* is as follows:—Formerly, in order to ascertain the strength of a spirit, some of it was poured upon gunpowder and inflamed. If, at the end of the combustion, the gunpowder inflamed, the strength of it was *proved*, and the specimen was said to be above proof; if, however, it contained so much water that the gunpowder did not take fire, it was under proof.

At present it is defined, by act of parliament, that proof spirit shall be such, that at the temperature of 51°, thirteen volumes of it shall weigh as much as twelve volumes of water.

HYDROPATHY.—This is the name of a system, or supposed system, of therapeutics, which has become very popular of late years. It consists in the use of water in various manners, attention to diet, residence in an institution, and consequent change of scenery and absence from business. That all this, in the great majority of chronic complaints, should be very serviceable, is evident

enough; but very little of the good that results from residence in a hydropathic institution is to be attributed to the water, and none of it to the curious modes of applying the water, which seem to be mere pieces of quackery.

HYDROPHOBIA.—This name is now applied to a disease which is believed to occasionally follow the bite of a rabid dog. Two supposed cases of this affection are described in pages 291—293.

HYDROTHORAX, or water in the chest, is the term that expresses the collection of a quantity of serous fluid in the cavity of the pleura. This may take place either in consequence of inflammatory effusion, or from some obstacle to the flow of the blood from disease of the heart. In the former of these cases, it is merely a symptom of pleurisy—see ‘Pleurisy’—and in the latter, it is a form of dropsy.

HYOSCINUS.—See ‘Henbane.’

HYPERTROPHY.—This term expresses the increase of bulk, without any change of texture. The best examples of it are to be found in the muscular system. The huge and brawny arm of a blacksmith, is an instance of preternatural size and strength, brought on by violent exercise. This takes place in consequence of a law of the animal economy, that increase of function should ultimately lead to increase of the quantity of blood sent to the part, and consequent increase of bulk. If one lung become incapacitated, the other has double duty thrown upon it, and soon, without any alteration of texture, becomes much larger.

Hypertrophy, then, is merely an effort of nature to qualify a part of the system for some extraordinary labour that it has to perform. Hence it can hardly be said to be a disease; but sometimes, in consequence of its increased bulk, it becomes a very dangerous affection. If, for example, there is any obstruction to the flow of blood from the heart to the aorta, the left ventricle requires to contract with greater force; by-and-by it becomes, in consequence of this, hypertrophied, and a very serious train of consequences follow. See ‘Heart, Diseases of.’ Another very serious hypertrophy, but one of very rare occurrence, is hypertrophy of the brain.

On the other hand, hypertrophy is often a salutary process. In rickets, for example, the bones being deficient in osseous matter, bend under the weight of the body, or under the influence of the contractions of the muscles that are attached to them. After a time, the deficiency of earthy matter is at an end, but the bones are permanently distorted, and less able for their office than if they were straight. These bent bones become hypertrophied in certain places, and they grow unusually thick, firm, and hard, just at the concave parts, where the pressure is strongest.

HYPNOTICS.—Medicines that have the power of inducing sleep.

HYPOCHLORITE OF LIME.—This is commonly

known by the name of Tennant's bleaching powder. It possesses very well marked and decided disinfectant properties, being able to destroy the most putrid odours, and also, it is believed, the miasmata of contagious disorders. This substance is accordingly much used as an application to gangrenous parts, to ulcers having putrid discharges, and to destroy all unpleasant odours. It is also sprinkled about the room in which any person ill of a contagious disorder is confined.

HYPOCHLORITE OF SODA.—This is called Labarraque's disinfecting fluid. It possesses similar properties to the above.

HYPOCHONDRIASIS is in fact a species of insanity, although it is always, or nearly always, connected with disorder of the digestive organs. It is characterized by lowness of spirits and despondency, and a most extraordinary propensity on the part of those affected by it to exaggerate and individualize all their sufferings and sensations, and to pay a most scrupulous attention to what is passing on, or what is thought to be passing on, within the system. Hypochondriacs, too, relate all the details regarding their health with an amazing minuteness, and never weary in repeating over and over again all their real and fancied symptoms.

The influence of different diseases upon the mind is a subject that has not, perhaps, been sufficiently attended to. In phthisis, for example, a disease, uniformly fatal, the patient believes that he will recover to the last; in kidney affections there is a peculiar fretful state of mind usually induced, which cannot be explained by the sufferings of the disease, and which, perhaps, is sometimes attributable to some retained urea; those affected with organic disease of the heart are liable to violent fits of passion and indigestion; and often when there is pain complained of in the hypochondria (whence the name of the disease), there is this strange and troublesome state of mind.

The symptoms complained of in hypochondriasis are innumerable. The following are the most common. The hypochondriac pain, which gives a name to the malady, is generally referred to the left side, and is probably an actual symptom, for there is often distension of it, apparently from flatulence. Sometimes, indeed, this enlargement is considerable, extends pretty low down, and feels hard to the touch, so much so, in fact, as sometimes to lead one to fear organic disease. The appetite is always abnormal. Sometimes it is voracious, but more usually there is disinclination and loathing for food. After eating, various unpleasant sensations are felt; sometimes there is acute pain, often heartburn, and almost always eructation. Along with the flatulence, a quantity of acid is often driven into the mouth, which is sometimes so intensely sour as to edge the teeth. All manner of uneasy sensations are felt in the abdomen. The head, too, is much complained

of. Absolute headache is not very common, but various morbid sensations are detailed. Thus, there is a feeling of intolerable pressure, which threatens every moment to extinguish life; the scalp is too tight, and there is a feeling as if the eyes would start from their sockets; the eyes themselves are dim, and if an object be earnestly looked at, it twinkles, or it induces a state of stupor in the mind; all sorts of noises are heard; there is incapacity of mental exertion, and there is always extreme dread, fear, and apprehension.

A symptom of hypochondriasis, by no means uncommon, is violent action of the heart, which the patient believes to be some fearful organic affection. By means of auscultation, however, the true nature of the malady is made apparent.

The great cause of hypochondriasis is luxury and idleness, and a case of the disease produced by these causes is the worst of all. Many such hypochondriacs spend whole years in doing nothing but attend and record all their morbid feelings. It also comes on in studious people who take too little exercise, and in people whose nervous system is shattered by reverses or despondency. Hypochondriasis is said to be more common in England than any other country. "England," says Georget, "is, perhaps, the country where this species of nervous disease chiefly abounds; this is principally owing to the prodigious activity of mind which exists in that country—to the miseries that are contingent on the great development of industry—to fortunes rapidly acquired in common by a number of people, who subsequently pass their whole lives without employment in excesses of every description."

Hypochondriasis would certainly seem to be a disease of the brain or nervous system. Like decided insanity, it is often recurrent, and individuals will sometimes quit their occupation and remain in bed for months; then, without cause, revive and get up, remain free from the disease for long, and then fall back for a period into the same state.

The treatment consists in breaking the mode of life, in insisting upon both mental and corporeal employment, and, if possible, in endeavouring to persuade the patient to have his mind in due discipline. To effect these purposes, change of scene, travelling, field sports, and a systematic literary and scientific pursuit will often be found effectual.

HYSSOP.—This contains a quantity of essential oil, and is an aromatic carminative and stimulant. It is very little used at present.

HYSTERIA.—Hysteria is a disease that has phenomena peculiar to itself, and that also imitates almost every known malady. It, therefore, requires to be considered under two heads.

A paroxysm of hysteria, or a hysterical fit, is almost peculiar to females. In general the trunk and limbs of an affected person are violently convulsed, so violently, indeed, that three or four stout

people can often not restrain a weakly young person thus attacked. The head is thrown backwards, and the throat projects, the face is flushed, the nostrils are distended, the mouth firmly clenched, violent screaming occurs, the hands beat the bosom or tear her hair or clothes, the breathing is irregular, and the heart's action palpitating. After a while the convulsions cease, and the hysterical person lies motionless, or passive and trembling, until after a time there is a mixture of laughing, crying, and sobbing, and the paroxysm is over. In some instances there are no violent convulsions.

The affected person feels pain in some part of her stomach, the sensation of a ball rising up the oesophagus and giving the sensation of choking, palpitation of the heart, and a violent propensity to laugh or cry, and to go through the above described process.

It is of great importance to distinguish between hysteria and epilepsy, and in general the distinction is not difficult. There is seldom complete loss of consciousness in hysteria; there is no foaming from the mouth, nor bleeding from injuries of the tongue, and no complete dilatation of the pupil.

Not only is the hysterical paroxysm confined almost exclusively to women, but to young or middle aged women, and pretty much to such of these who are debilitated from disease, or who have not their minds under due control. Hysterical paroxysms, too, are particularly liable to be imitated, and it is well known that if a hysterical patient be admitted into the ward of an hospital, there are sure ere long to be other cases. Such, however, may be restrained by the dread of punishment.

Of diseases that hysteria imitates the most common is inflammatory pain in the sides. In nine hundred and ninety-nine cases of a thousand of these occurring, in otherwise healthy young women, they may be safely set down as nervous, and treated with aloes and assafoetida. Another symptom of hysteria is apparently inflammatory pain of the peritoneum. In such cases the real nature of the malady may generally be made out by the *excessive* tenderness of the abdomen to the touch. Palsy, loss of voice, threatening of cancer in the breast, cough, hiccup, and other purely nervous affections, are for ever occurring in hysterical women, and annoy and sometimes baffle the practitioner.

Two very common hysterical affections are those simulating diseases of the spine and the joints. In fact, the great majority of people complaining of spinal disease, and of young women who have violent pains and loss of motion in joints, are simply suffering from hysteria.

The treatment of a fit of hysteria consists in preventing the patient from injuring herself by loosening her dress, laying her on a bed, and, if necessary, holding her. The paroxysm may then often be shortened by administering assafoetida, &c., or dashing cold water upon her face. In cases of long-

continued contraction of the joints, &c., there is nothing so successful as long applied jets of cold water. But the principal treatment is the moral one, and, to quote Sir Benjamin Brodie, "You can render no more essential service to the more affluent classes of society than by availing yourselves of every opportunity of explaining to those among them who are parents, how much the ordinary system of education tends to engender the disposition to these diseases among their female children. If you would go farther, so as to make them understand in what their error consists, what they ought to do, and what they ought to leave undone, you need only point out the difference between the plans usually pursued in the bringing up of the two sexes. The boys are sent at an early age to school, where a large portion of their time is passed in taking exercise in the open air; while their sisters are confined to heated rooms, taking little exercise out of doors, and often none at all, except in a carriage. Then, for the most part, the latter spend much more of their time in actual study than the former. The mind is over educated at the expense of the physical structure, and, after all, with little advantage to the mind itself; for who can doubt that the principal object of this part of education ought to be, not so much to fill the mind with knowledge, as to train it to a right exercise of its intellectual and moral faculties, or that, other things being the same, this is more easily accomplished in those whose animal functions are preserved in a healthy state than it is in others."

IATRATYPEPTIC METHOD.—This consists in applying medicines through the skin, by the aid of friction. It was employed by Hippocrates, and other old authors, but for long was in disuse until modern times. The substance thus designed to be introduced into the system is finely powdered, suspended in water, oil, or fat, and diligently rubbed into the skin. It is useful in cases where a patient cannot or will not swallow, or where the stomach is so irritable that it can retain nothing.

ICE.—Ice is sometimes employed to check hæmorrhage, particularly in those cases where the wounded vessel cannot be got at. In many cases, too, where the bleeding does not proceed from a ruptured vessel, but is an exhalation, the application of ice is followed by beneficial effects. It is thus applied to the chest, in cases of pulmonary hæmorrhage. In inflammation of the brain, ice pounded, put in a bladder, and thus applied to the scalp, is often very useful. It is used in the same manner in fevers that are characterized by great cerebral excitement.

Ice, too, is sometimes employed in the way of friction. It is rubbed occasionally over the skin, in the rheumatism of old and enfeebled persons, with a view of producing reaction; but its most common use in this manner is in frost-bitten parts. After a part has been exposed to intense cold, if it be not

very gradually warmed, it is sure to mortify. By rubbing such at first with snow or powdered ice this danger is avoided.

ICELAND MOSS.—This is not a moss but a lichen. It has long been esteemed in Iceland and Scandinavia as a remedy for pulmonary consumption, and other chronic diseases. It grows in Scotland, but that sold in the shops is imported from Hamburg, and said to be gathered in Norway and Sweden. It contains mucilage and a bitter principle, and is a demulcent and tonic. It may be given as such in consumption and other chronic diseases. It is needless to say that it cannot cure the first-mentioned disease. It is best given in the form of a jelly, flavoured with wine, &c.

ICHTHYOSIS, or the fish-skin disease, is characterized by a very thickened, hard, scaly condition of the cuticle, and not attended by any heat, itching, or pain. It is often hereditary in families. The scales are confined to portions of the body. It is little, or not at all, amenable to treatment.

ICTERUS.—See 'Jaundice.'

ILICUS, or **ILIAC PASSION.**—This is the name given to a symptom witnessed both in spasms of the intestines—see 'Spasm'—and in inflammation—see 'Peritonitis'—characterised by violent pain and persistent vomiting.

ILICUM ANISATUM.—This is a Chinese tree which yields the star anise or badiana, which is imported to Europe. It is aromatic and carminative, and the flavouring ingredient of the *anisette de Bourdeaux*.

IMPERIAL.—This drink is a weak solution of cream of tartar. It is employed for allaying thirst in fever and other acute affections.

IMPETIGO.—This is a pustular disease of the skin. It consists of pustules, sometimes scattered, at others, collected into groups, which burst, dry up, and form a scab. These scabs or crusts are yellow, and a considerable discharge takes place from underneath them. In this manner they become thicker and larger. The skin around them, as well as underneath, is red and inflamed. It is not contagious.

Sometimes this complaint occurs in an acute form and is attended with fever. Such cases require antiphlogistic treatment. When chronic, alkaline medicine should be given internally, and the scabs washed with an alkaline or weak spirit lotion.

One form of impetigo, and a very ugly one, is apt to attack the face of children, and cover it as it were with a mask. This is often called the milky crust. A weak solution of oxide of zinc is said to be efficacious in it.

IMPURE AIR, although not an exciting, is a powerful predisposing cause of disease, as is indicated by the far higher mortality that prevails amongst the inhabitants of great towns, as compared with a similar class in the country. It seems in particular to predispose to scrofula.

INANITION, DEATH BY,—see 'Syncope.'

INCOMPATIBLES.—Any salt that is decomposed by a substance is said to be incompatible with it, and of course care must be taken in mixing medicines, not to introduce two incompatibles. Any substance that contains tannin, for example, is incompatible with a salt of iron, nitrate of silver with common salt, &c.

INCUBUS.—The nightmare.

INDIGESTION.—This is the most frequent malady of civilized life—one that is productive of a great amount of suffering, and one too, unfortunately, regarding which a great deal of quackery and ignorance prevails. Indigestion is characterized by one or more of the following symptoms—loss of appetite, nausea, vomiting, flatulence, pain, and water-brash.

The loss of appetite is sometimes a wholesome symptom, as it prevents the patient taking food that his stomach cannot possibly digest; but of course, if it lasts too long, its consequences are dangerous. As hunger is believed to depend upon some condition of the nerves of the stomach, so the want of it is probably connected with some morbid functional state of these organs. Indeed we have a good instance of the connection between hunger and the nervous system in the common occurrence of an appetite for food being suddenly lost, by some cause acting upon the latter.

When loss of appetite is the prevailing symptom of indigestion, it may often be removed by the exhibition of bitters, and of the mineral acids, or the two combined.

Nausea and vomiting are more distressing symptoms. In some instances, nausea comes on soon after taking food, and increases in intensity until vomiting be excited. In others, however, there is little or no nausea, but the vomiting comes on an hour or two after taking food. Occasionally the whole of the contents of the stomach are ejected, and the retching may even then continue, and a little bile be thrown up, which has regurgitated from the duodenum. It is this that makes so many imagine that indigestion is somehow caused by, or connected with, the biliary secretion.

In cases of chronic vomiting, however, the whole of the food taken is not thrown up, but a small portion is retained; and upon this fact the most rational treatment of chronic vomiting is based. The quantity of food should be at once reduced to the amount that can be retained, then cautiously increased. Various remedies, however, have an effect in allaying vomiting, particularly when it is occasional only, and not habitual; carbonic acid certainly possesses this action, and is best given in the form of soda water. The effervescing draughts formed by decomposing a carbonate by a vegetable acid are not so useful, owing to the neutral salt that is formed often disagreeing with the stomach. Often vomiting in indigestion may be traced to acidity, and then we

may expect relief from alkalies. The prussic acid was once considered as a kind of specific in this affection, but it very often fails; so also does kreosote.

Flatulence often comes on before eating, and is often, in such cases, referable to allowing too long intervals to elapse between meals. It is relieved by carminatives. It is said that the flatulence that occurs after taking food may be prevented by taking before dinner a pill composed of extract of rhubarb and cayenne pepper. Along with the flatulence, quantities of food are often driven into the mouth. This is called rumination, and the matter ruminated is often intensely acid. In such cases alkalies should be tried.

The water-brash is a modification of this rumination. It is characterized by the exudation of a watery fluid, either tasteless or sourish, and which generally feels to the patient cold. It comes on principally when the stomach is empty, and is generally preceded by a pain in the stomach, often of an acute nature. This pain is increased by the erect posture, and a person suffering from it may generally be noticed to stoop forward. The quantity of fluid brought up is sometimes excessive.

The water-brash may occur as a symptom of organic disease in the stomach, but usually is a mere form of indigestion. It seems to be favoured by a farinaceous diet, and is far more common in Scotland than in the southern part of the island. We possess a medicine that is almost specific in it, and that is the nitrate of bismuth.

People subject to indigestion are apt to have occasional paroxysms, which sometimes follow an error in diet, and sometimes some unusual fatigue, but which occasionally come on without assignable cause. Usually a violent headache is felt on such occasions, on awakening in the morning, which continues for some time, and is accompanied by much nausea and occasional fits of vomiting. These attacks are popularly known by the name of sick or bilious headaches.

INDIGO.—This blue pigment has been known for long, and is extensively cultivated in India. Of late it has been employed as a medicine, principally in convulsive diseases, and especially in epilepsy. In the idiopathic form of this disease, even in cases of long standing, it is said to have been successful. Those who have used it report that at first the frequency of the paroxysms is increased. The dose of it requires to be large, nearly an ounce in the course of the day, although at first a much smaller quantity is tried.

INDURATION.—Various parts of the body are liable by disease to be changed in consistence. When they are hardened they are said to be indurated. This may happen in consequence of inordinate fulness of the blood-vessels of any part, or from the depression of the fluid part, and compression of the solid. Or it may be caused by the abnormal deposition of extraneous matter in a portion of an

organ. A common example of this last occurs when bone is deposited where it should not be, and where ossification, as it is called, takes place.

INFANTILE DISEASES.—The diseases of children differ from those of adults, partly owing to the mobility of nervous system which this class of patients have, and partly owing to children being exposed to the irritation of teething. See 'Hydrocephalus,' 'Infantile Remittent Fever,' 'Teething,' &c.

INFLAMMATION.—This is a very important and frequently occurring disease, to which, too, every part of the body is liable. Not only is it a disease in itself, but it is apt to come on, and often does so fatally, in the course of almost all chronic diseases. A great many chronic diseases, also, have their origin in an attack of inflammation. It has, consequently, been more carefully studied than any other malady that attacks the human frame.

It is of importance in another point of view. Inflammation is one of the curative powers of nature; it is by means of it that wounds heal, that mortification takes place without hæmorrhage, and that many an occurrence in the structure that would otherwise prove fatal is rendered innocuous. In like manner (for inflammation can be artificially exerted), the medical man often uses it as a means of cure.

Ordinary inflammation is characterized by four symptoms—pain, heat, redness, and swelling. If, for example, a man receive a bruise or cut on any part, that part soon begins to be painful and hot, next it becomes red, and in a little swells. The swelling and the redness are apparent, nor is the feeling of heat a sensation merely, for, if a thermometer be applied to the inflamed spot, its mercury rises to a higher degree than it does when put to any other part of the injured man.

If the inflammation reach a sufficient degree of intensity, the general system participates in the affection. There is shivering, followed by increased heat of the whole body, thirst, and headache. This is called the inflammatory fever.

A case of inflammation once set up in the system may be followed by a variety of consequences. Sometimes the pain abates, the part returns to its natural degree of warmth, the gorged vessels resume their natural size, and, in consequence, the swelling and redness disappear. This is the mode of termination that is always to be desired, and it is called termination by *resolution*, and implies that the inflamed part has gone back to a state of perfect and previous health.

This fortunate ending may not, however, occur. The pain, and the heat, and the swelling, and redness, may, instead of abating, increase in intensity. The swelling then begins to project in the centre, and the skin over the projecting bit to become softer and appear white; the pain assumes a peculiar kind of throbbing nature, and at last the skin breaks, and a quantity of cream-like fluid, called pus, is

poured forth. This is called termination by suppuration.

There is a worse termination than this. If the inflammation be very intense, the vitality of the inflamed part may be altogether destroyed. In this the red of the affected part becomes purple or black, the pain ceases, the part loses all sensation, and at length falls off a mere mass of putridity. This is named termination by mortification.

The accompanying fever may be very intense, and blood taken from any one suffering from it is found to be cupped and to have the buffy coat; but, in those cases where the local termination tends to mortification, or at least in a great many of them, the fever assumes quite a different type. The affected man becomes feeble and delirious, a peculiar starting of the tendons of his muscles is to be observed, his tongue is dry and trembling, his lips black and covered with sordes, his pulse very feeble, and he is in imminent danger of death, generally in the way of syncope. This is called typhoid fever.

With regard to the pain of inflammation, it varies very remarkably. Sometimes it is mere uneasiness, and at others absolute agony. And what is very remarkable, those parts, such as bones and tendons, which in health are scarcely sensitive at all, become, when inflamed, most exquisitely so. The kind of inflammatory pain, too, varies very much according to the tissue affected. This, in common inflammation of the skin, or erysipelas, is of a tingling smarting nature. In serous membranes it is sharp and piercing, and is usually likened to the stabbing of a knife; the pain of mucous membranes in a state of inflammation is not severe, and the sensation felt by inflamed bones often amounts to agony. Then, while the organs of taste and smelling, if inflamed, have their relations to smell and taste very much deadened, those of sight and hearing become most exquisitely sensitive to their peculiar impressions. The pain in inflammation, and this is a very important fact in diagnosis, is invariably increased by pressure.

The pain in inflammation is probably consequent upon the swelling, and is owing to the unnatural pressure of the nerves of the part, and the greater pain experienced in inflammation of hard parts, like bones, is probably owing to the fact, that these cannot yield as softer organs can.

The heat, too, is caused by the increased flux of arterial blood, and, therefore, of oxygen to the part. The rise in temperature is rarely more than six or seven degrees, and often much less.

The redness in inflammation is owing to the same cause, and entirely dependent upon the larger quantity of blood which is attracted to the inflamed part. Not only are the vessels that contained red globules in the ordinary state of health fuller than before; but smaller vessels, which do not receive ordinarily such globules, become distended with them.

The swelling, too, in part, and at an early period,

depends upon the same congestion; but it is afterwards owing to a variety of secretions that the blood pours out into the inflamed organ. First of all, there is a tendency, in ordinary inflammation, to effuse into the structure of the part inflamed some of its serum, then some of its fibrine (which is called in such a case, lymph), and then the morbid product, pus or matter. The effused lymph may become organized, supplied with blood vessels, and a part of the structure of the body.

This tendency to the formation or deposition of fibrine or lymph is not peculiar to the blood at the inflamed part, but is common to all the blood in the body, and hence it is that blood abstracted from a person suffering from inflammation is cupped and exhibits the buffy coat.

It is owing to this effusion and subsequent organization of lymph that wounds unite, and the evil consequence of external injuries is provided against.

One of the circumstances that determines the effusion of pus in inflamed parts would seem to be exposure to the air. In ordinary pleurisy, for example, arising from exposure to cold, there is very seldom any pus secreted, nothing but serum and lymph. If, however, the pleurisy be caused by a punctured wound from without, or by other causes that admit the air, pus is abundantly secreted. In inflammation of the conjunctiva again, a texture very abundantly exposed to the air, secretion of lymph rarely takes place, while that of pus is very common.

During the course of inflammation, absorption very clearly takes place in the inflamed part. Not only do a portion of the effused serum, &c., disappear, but some of the substance of the part itself. When this absorption prevails over the deposition from the nutritive function, an ulcer is formed. In such an ulcer three things may generally be observed going on—depositions of lymph, which are called granulations—excretion of pus, and more or less absorption of the previously existing tissues. When the last predominates, the ulcer gets bigger and bigger, and is often called phagadenic; when a portion dies and mortifies, the ulcer is called a sloughing one; when the deposition of lymph is too excessive, the lymph deposited is called proud flesh; and when these are deficient, we have what is technically called a callous or indolent ulcer.

When these processes go on on the surface, they are obvious enough. When occurring in internal parts of the body, it requires all the skill of the physician to form a correct opinion of the nature of the changes that are taking place. A great deal in this respect may be learned by an attentive observation of the accompanying fever. In general this is not set up until the local congestion has taken place, although, in some cases, as in rose, inflammation of the lungs, and of the tonsils, the fever prevails some time before the local inflammation begins; and

in others again, as in pleurisy and peritonitis, the inflammation and the fever commence simultaneously. In general, the intensity of the fever is in proportion to the violence of the inflammation; but to this there are important exceptions. In the quinsy, for example, a disease attended with little danger, the fever is most ardent, while in inflammation of the stomach and bowels, owing to the depressing effect upon the circulation, there is little febrile reaction, and the pulse is feeble. All these are very important facts in practice.

If, in the course of an inflammation, shivering fits come on, we may conclude that pus is forming. If the pain very suddenly cease, we may apprehend the worst result—mortification.

Inflammation is modified according to the tissue affected. These modifications are described under their proper heads, but a summary of them is proper here. Inflammation of the areolar tissue, underneath the skin, generally tends to form abscesses, the boundaries of which are walls of lymph. Occasionally, however, particularly if the inflammation have been caused by a dissection wound, these walls do not control the suppuration, and there is that dreadful disease set up, called diffuse inflammation of the cellular tissue. Inflammation of the solid viscera is very like that of the areolar tissue. Inflammation of the lungs, however, rarely forms an abscess, and inflammation of all these organs very seldom ends in mortification. Moreover, the pain in them is usually little. Inflammation of the serous membranes, again, is attended with much pain, great tendency to deposit lymph, and rarely pus. On the other hand, inflammation of the mucous membranes is attended with little pain; there is little tendency to exude lymph, but pus is freely discharged.—See also 'Veins, Inflammation of.'

The rapidity with which inflammation runs through its various stages, varies very remarkably in different instances. When the rapidity is great, the name *acute* is applied, and when not, *chronic*, to the affection.

There are various specific inflammations.—See 'Scrofula,' 'Tubercles,' 'Scirrhus,' and the different skin diseases.

The treatment of inflammation is well understood. It consists in the antiphlogistic regimen, bloodletting, general and local, counter-irritation, purgatives, mercury, tartar emetic, and perhaps, above all, opium.—(See the various inflammations under their different heads.) Very chronic inflammation is often more of the nature of a perversion of nutrition, and may require tonic and alterative treatment.

INFERNAL STONE.—An old name for nitrate of silver.

INFLUENZA.—This is a catarrh that prevails epidemically. It is the *grippe* of the French.

Of all epidemics, it is the most sudden in its invasion, the most rapid in its progress, and the most extensive in its range. It has been known as an epidemic from the time of Hippocrates downward. When once it makes its appearance, it pursues a regular course from country to country, passing over seas and mountains; but, in general, each epidemic has its course somewhat varied from the rest. In 1510, for example, its course was north-west; in 1557, due west; in 1803, it was south, &c.

It often attacks a large portion of the population on the same day. Its symptoms are as follow: Shivering, headache, much pain in the frontal sinuses, watering of the eyes, sneezing, and running from the nose; then tickling of the throat and chest, and cough; and along with all these there is an extraordinary debility, and often a depression of the mental faculties.

Ordinary cases of the disease last three or four days, but a chronic cough is very apt to be left behind. But in many cases it is a fatal disorder, and this is particularly the case when it attacks the old or enfeebled. "More persons," says Watson, "have died of the influenza in the present year (1833), than died of the cholera when it raged in 1832."

Influenza does not appear to be a contagious disease. It is clearly dependent upon some atmospheric cause, and suddenly pervades very large tracts of country. It is farther observed, that while the influenza is prevailing among the human species, the domesticated animals are particularly liable to epizootic affections.

Still, what this atmospherical cause is, has never been determined. An explanation which, although hypothetical, and not supported by ascertained facts, is still very probable, was proposed by Dr. Holland, and is called the insect hypothesis. We know that insects exist in very great abundance, of so minute a form that they are not appreciable to our unaided senses; and we also know that certain unknown causes bring, very suddenly and extensively, swarms of these into being. It is possible to conceive that the germs of these creatures may be present in the air; that certain circumstances may favour their hatching; and that, when in contact with the mucous membranes, they may produce a sudden and extensive invasion of a disease.

The treatment of an ordinary case of influenza, consists in confining the patient to bed, and if the cough be troublesome, to order expectorants and a blister. If the depression become alarming, it must, of course, be treated with stimulants.

INFUSIONS AND DECOCTIONS.—These are solutions of vegetables very much employed in medicine. An infusion is prepared by simply pouring hot or cold water upon a vegetable medicine, and

allowing it to stand for a little, in the same manner as tea is made. A decoction, on the contrary, is boiled for some time, and is a form that is necessary when the active properties of the drug are not very soluble in water. The pharmacopœias give directions for the preparation of almost all the infusions and decoctions that are used. The preparation of these, with their uses and doses, is here presented.

Compound Decoction of Aloes.

Extract of liquorice,Seven drachms.
Carbonate of potassa, ...One drachm.
Aloes,
Myrrh,
Saffron, of eachOne drachm and a half
Compound tincture of
cardamoms,Seven drachms.
Distilled water,One pint and a half.*

Boil down the liquorice, carbonate of potassa, aloes, myrrh, and saffron, to a pint, and strain. Then add the tincture of cardamoms. This is one of the best of the tonic and antacid cathartics. Its dose is from half an ounce to two ounces.

Compound Infusion of Horseradish.—Take of

Sliced horseradish,
Bruised mustard seeds,
of each,One ounce.
Compound spirit of horse-
radish,One ounce.
Boiling water,One pint.

Macerate the root and the mustard seeds for two hours, then add the spirit. This is a stimulating diuretic, and is used in chronic rheumatism and dropsies. Its dose is from one to two ounces.

Infusion of Bucku.—Take of

Bucku,One ounce.
Boiling water,One pint.

Macerate for two hours, and strain. This is a tonic and sudorific, employed in rheumatism, skin disease, &c. Its dose is from one to two ounces.

Infusion of Columba.—Take of

Sliced columba,Five drachms.
Boiling or cold water, ...One pint.

Macerate for two hours in a lightly covered vessel, and strain. This is an excellent stomachic and tonic, and very seldom disagrees with the stomach. It appears also to possess the power of allaying vomiting, when this does not depend upon an inflammatory condition of the stomach.

Infusion of Cloves, or Clove Tea.—Take of

Bruised cloves,Three drachms.
Water,One pint.

Macerate, and strain. This is aromatic and carminative, and employed in flatulent dyspepsia, and the like. Its dose is about an ounce.

* A pint, it must be remembered, is twenty ounces, nearly a wine quart.

Infusion of Cascarella.—Take of

Cascarella bark,.....One ounce and a half.
Boiling water,.....One pint.

Macerate, and strain. This is an aromatic tonic, and very well suited for being administered along with aqua potassa in cases of dyspepsia, characterized by acidity. Its dose is a wine-glassful. A mixture made of it, syrup of squills, and compound tincture of camphor, is said to be useful in chronic bronchitis.

Compound Infusion of Catechu.—Take of

Powdered catechu,.....Six drachms.
Bruised cinnamon,One drachm.
Boiling water,.....One pint.

Macerate for an hour, and then strain. This is a much used astringent, and has generally some opium combined with it. Its dose is from one to two ounces.

Infusion of Chiretta.—Take of

Chiretta,Four drachms.
Boiling water,One pint.

Infuse for two hours, and strain. This is a tonic infusion, believed to be suitable for gouty dyspepsia. The dose is a wine-glassful.

Decoction of Cinchona Bark.—Take of

Cinchona bark,.....Ten drachms.
Distilled water,One pint.

Boil for ten minutes, and strain while hot. This is a most important tonic and antiperiodic preparation, and, before the discovery of quinine, the most important manner of administering the bark in ague. Its dose is a wine-glassful.

Infusion of Cinchona Bark.—Take of

Cinchona,One ounce.
Boiling water,One pint.

Macerate for six hours, and then strain. This is tonic and stomachic, but not strong enough for a petrifuge. It is employed when the stomach is delicate, and cannot support the more active preparations of the bark.

Infusion of Foxglove.—Take of

Dried foxglove leaves,....One drachm.
Spirit of cinnamon,.....One ounce.
Boiling water,.....One pint.

Macerate the foxglove leaves for four hours in the water, and then add the spirit of cinnamon. This is a very energetic preparation, very useful in many forms of dropsy. Its dose is a table-spoonful every six hours.

Compound Infusion of Gentian.—Take of

Sliced gentian root,.....Two drachms.
Dried orange peel,.....Two drachms.
Fresh lemon peel,.....Four drachms.
Boiling water,.....One pint.

Macerate for an hour, and strain. This is a tonic

and stomachic, and the most extensively employed of all such.

Decoction of Liquorice.—Take of

Bruised liquorice root,....One ounce and a half.
Water,.....One pint.

Boil for ten minutes, and strain. This is an agreeable demulcent. Any quantity may be taken.

Decoction of Guaiacum.—Take of

Guaiacum turnings,Three ounces.
Sassafras,.....One ounce.
Water,Eight ounces.

Boil down to five ounces. This is the old and once very famous "decoction of the woods." It is still employed in chronic, cutaneous, and rheumatic diseases. Its dose is five ounces three or four times in the day.

Decoction of Logwood.—Take of

Logwood chips,One ounce.
Powdered cinnamon,....One drachm.
Water,.....One pint.

Boil the logwood in the water down to ten ounces, adding the cinnamon towards the end, and strain. It is a very useful astringent preparation, the dose of which is from one to two ounces.

Compound Infusion of Linseed.—Take of

Bruised linseed,Six drachms.
Bruised liquorice root,....Two drachms.
Boiling water,.....One pint.

Digest near the fire, and strain. Often used in *ad libitum* doses in irritable and inflamed conditions of the mucous membranes.

Compound Decoction of Mallows.—Take of

Dried mallow,One ounce.
Dried chamomile flowers,....Half an ounce.
Water,One pint.

Boil for a quarter of an hour, and strain. It is principally used for fomentations in sprains and other external injuries.

Infusion of Mint.—Take of

Dried spearmint leaves,....Two drachms.
Boiling water,As much as will afford six ounces of strained liquor.
Refined sugar,Two drachms.
Oil of spearmint,Three drops.
Compound tincture of
cardamoms,Half an ounce.

Digest the leaves for half an hour in the water, and when cold strain, then add the sugar, dissolve the oil in the tincture, and then add that. This is a grateful stomachic, and a very good vehicle for many other medicines.

Decoction of Poppies, or Poppy Fomentation.—Take of

Sliced poppy heads,.....Four ounces.
Water,.....Four pints.

Boil for a quarter of an hour, and strain. This

is a very good fomentation for bruised or tender parts, and also for applying to the outside in cases of inflammation of the viscera.

Infusion of Quassia.—Take of

Chipped quassia wood,.....Two scruples.

Boiling water,.....A pint.

Macerate for two hours, and strain. This is extensively used in all cases where a pure bitter tonic is indicated; and it possesses the advantage of being compatible with salts of iron.

Decoction of Oak.—Take of

Bruised oak bark,Ten drachms.

Water,.....Two pints.

Boil down to one pint, and strain. This is used as a local astringent in the shape of gargles and lotions, and sometimes as a bath for children.

Infusion of Rhubarb.—Take of

Powdered rhubarb,.....Three drachms.

Spirit of cinnamon,Two ounces.

Boiling water,.....Eighteen ounces.

Macerate, and strain. It is a stomachic and mild purgative. The dose of it is from one to three ounces.

Compound Infusion of Roses.—Take of

Dried petals of the Rosa

gallica,Three drachms.

Diluted sulphuric acid,.....One drachm and a half.

Sugar,.....Six drachms.

Boiling water,.....One pint.

Pour the water upon the rose petals in a glass dish, then mix the acid, macerate for six hours, and add the sugar.

This is a very agreeable refrigerant and astringent, and is used as a drink, particularly in hectic fever. It nearly covers the bitter taste of Epsom salts, and increases their strength by converting them into a bisulphate. It is an excellent gargle for relaxed sore throats. Each ounce of it contains four minims and a half of diluted sulphuric acid.

Decoction of Sarsaparilla.—Take of

Sliced sarsaparilla,Five ounces.

Boiling water,.....Four pints.

Macerate for four hours near the fire, then take out and bruise the sarsaparilla. When bruised, return it to the liquor, and again macerate for two hours; afterwards boil down to two pints, and strain.

Compound Decoction of Sarsaparilla.—Take of

Decoction of sarsapa-

rilla, boiling hot,.....Four pints.

Sliced sassafras,

Guaiacum shavings,

Liquorice root, of each,.....Ten drachms.

Mezereon,.....Three drachms.

Boil for a quarter of an hour, and strain. The dose of these two decoctions is about six ounces three times in the day.

Infusion of Senna.—Take of

Senna leaves,.....Fifteen drachms.

Bruised ginger,.....Four scruples.

Boiling water,.....One pint.

Macerate for an hour. This is a very commonly employed purgative. Combined with Epsom salts it forms black draught. Its dose is from two to four ounces.

Decoction of Dandelion.—Take of

Fresh taraxacum, herb

and root,.....Seven ounces.

Water,Two pints.

Boil down to one pint. This is given in chronic liver affections. Its dose is three or four table-spoonfuls.

Infusion of Valerian.—Take of

Valerian, in coarse powder,.....Two drachms.

Boiling water,Seven ounces.

Let it stand for an hour, then strain. The dose is an ounce.

INOCULATION.—This consists in inserting a morbid fluid, formed in the body of one person, into that of another. It is, however, especially applied to the practice, now obsolete, of producing the small-pox, by taking the matter of a small-pox pustule, and introducing it into the blood of a healthy person. This latter will, in the course of from seven to ten days, take the small-pox; but, owing principally to care having been taken that he was in a state of good health, in a very mild form. Of every six that take the natural small-pox, one dies; whereas, of every five hundred who thus have it given to them, four hundred and ninety-nine recover.

The custom is of great antiquity. It has long been practised in the East, in Africa, in Wales, and the Highlands of Scotland. It was introduced into England from the East by Lady Wortley Montague. It was performed upon six criminals, who were promised pardon if they escaped the disease, which they did. It then became almost universal, and remained so until the discovery of vaccination.

In all probability the custom of inoculation greatly aggravated the mortality produced by small-pox. The individual inoculated was safe, but he became the cause of the death of many who took the natural small-pox from him.

Some experiments were made about a century ago by Dr. Home, which consisted in inoculating people with the blood of an individual affected with the measles. He found that the disease was readily communicated in this manner, that it ran a milder course than an ordinary case of fever, and that, in particular, there were no chest affections.

INSANITY.—This subject may be here treated under the four heads—of the causes, the varieties, the treatment, and the prevention.

I. The Causes of Insanity.—The tendency to in-

sanity is decidedly hereditary, and is transmitted from the parent to children; and those of the same family who take the disease, are very often noticed to take it in the same form, and to have their first accession at the same age. As may readily be imagined, the tendency to take the disease in this manner is still greater when both parents have been insane, or when there is a tendency to the affection in the families of both parents. In such individuals, the slightest cause, such as would have no effect upon, or produce another disease in ordinarily situated people, sets up mental alienation.

It is very remarkable that sex predisposes to insanity differently in different countries, and in different states of society. In Great Britain there are more male than female lunatics, the proportion of insane males to insane females being as 13 to 12. Such also is the case in Italy. But in France the very reverse is the fact; and in that country the females so affected are as 14 to 11. Esquirol, from an extended inquiry, has come to the conclusion, that, upon the whole, there are rather more women than men afflicted with insanity. This is still more strikingly the case in the lower ranks of society, and when we get to the higher, we find the number of male lunatics in excess.

In general, at least in the northern countries of Europe, insanity prevails more among the lower than the higher classes. This is probably owing to the fact, that, at least in thinly populated districts, members of the poorer orders intermarry more with one another, and thus spread the hereditary predisposition to the disease.

Insanity prevails to a much greater extent in some countries than others. In Turkey, in Spain, and in Italy, it appears to be a comparatively rare disease. In France, about one in every thousand of the whole population is insane; the same proportion is the case with regard to England; while in the two mountainous countries of Scotland and Norway there are nearly twice as many, the greater proportion in these two last-mentioned countries being probably owing to the greater number of idiots. In the United States of America, the number of insane appears to be very great.

Insanity is not a disease of childhood, and rarely appears before the ages of sixteen or seventeen. The tendency to it then goes on increasing up to forty.

The exciting cause of it is, in the majority of cases, some moral cause not usually, but sometimes, of a sudden and violent nature, but one that is depressing and long continued. Thus, pecuniary distresses, family disappointments and disasters, and the like, very often induce it. A very common cause in young females is disappointment in love; and numbers of this class, too, are apt to have a fit of insanity induced by a sudden fright. A great many cases of insanity are brought on by religious

excitement. Young men, too, occasionally induce the disease by excessive study.

A great many cases of insanity are induced by physical causes, as injuries of the head, tumours pressing upon the brain, diseases of that organ, or of the nervous system, such as epilepsy, and the like.

There is no doubt, too, that there is a state of mind produced by want of occupation and wholesome amusement, which either strongly predisposes to insanity, or even induces the disease.

II. *Varieties of Insanity.*—We may, in this dictionary, arrange these under five heads: 1. General Derangement of the Faculties; 2. Monomania; 3. Disorders of the Feelings and Propensities; 4. Mixed Forms; and, 5. The state of Fatuity which any of the above forms may pass into.

1. *General Derangement of the Faculties.*—This constitutes an ordinary attack of insanity. There are a great many degrees of it. In all its forms it is characterized by delusion, and there are generally violent paroxysms, in which the sufferer is dangerous to those about him. When such latter are well marked, the disease is often termed mania, or, vernacularly, a fit of madness. The following is an account of what is often to be observed in a case of acute mania. Before the access, there is a change to be observed in the man's manner and appearance; he is usually subject to violent fits of passion, and to some confusion of ideas. He passes his time in a state of feverish excitement, neglects his food, and suffers from sleeplessness. At last it becomes apparent that his reason is affected; he repeats his words, talks nonsense, and at last breaks out into a fit of violence that requires restraint. The disorder goes on to its highest pitch; "the thoughts and feelings are expressed with cries and ejaculations, and with agitation displayed in the manner and countenance; with violent and irregular movements and gestures; the internal sentiments or feelings so absorb the attention, that the patient becomes almost unconscious of external impression." After a while these symptoms usually abate, and there is either recovery or a lucid interval.

2. *Monomania.*—This, or partial insanity, was formerly termed 'Melancholia,' from the impression, which is not correct, that there is always in it depression of spirits. A person affected by it is coherent, and can converse rationally upon most subjects, but he clearly labours under some particular delusion, or hallucination. The subject of the delusion is very various. A butcher imagined that he had a leg of mutton stuck to his nose. Many monomaniacs fancy they have lost their heads, or that that organ is turned the wrong way, and others that they are changed to some other form. Such as these last are described by Pope:—

"Unnumbered throngs on every side are seen,
Of bodies changed to various forms by spleen;
Here living teapots stand, one arm held out,
One bent, the handle this, and that the spout;
A pipkin there like Homer's tripod walks;
Here sighs a jar, and there a goose-pie talks."

It is observed by Esquirol, that the form of monomania very much depends upon the state of society. For example, in France, in 1791, there was at Versailles a great number of suicidal monomaniacs. The death of the king and his family produced a great many, as also did that of the Duc d'Enghien. When the pope visited France, a great many religious monomaniacs were called into being. When the emperor formed so many new dynasties, a number of monomaniacs sprung up, whose delusion was that they were kings and queens, emperors and empresses. The abolition of the elder branch of the Bourbons produced its monomaniacs, and many monomaniacs were affected with the hallucination that they were the dauphin.

Although there is monomania without melancholy, yet there is a kind of insanity, and a very painful one it is to witness, in which the prevailing hallucination is a deep and settled melancholy. A melancholic lunatic generally passes his time in inactivity and solitude; he seldom sleeps well, being kept awake by his fear and despondency; if his eyes close, he often sees a number of phantoms that terrify him, and if sleep come on, he is often awoke from it by frightful dreams. Melancholics often refuse to take sustenance, and sometimes abstain from food for many days together. Sometimes they fear the meat offered to them is poisoned; at others, they are under the delusion, that if they eat it some calamity will befall their friends; and at others, there can be little doubt but that the intention is to starve themselves to death. In melancholy, the mind is scarcely employed at all, and usually the affections are so far affected, that individuals previously beloved are uncared for.

Among cases of monomania, may probably be arranged insane impulses to commit certain crimes. In these cases, the will would seem to be under the influence of a disordered imagination, which drives a person, without any premeditation and suddenly, to commit some great crime. These impulses are sometimes discovered to be dependent upon epilepsy, or other disease of the nervous system. One of them consists in a desire to kill. Of such, the following is, perhaps, a good illustration:—"A gentleman, thirty-two years of age, tall, rather thin, of a nervous temperament and amiable character, had received a good education, and cultivated the arts; he had been ill with a cerebral affection, but had been recovered from it for some months. He went to Paris, and for two months conducted himself in the most regular manner. One day he went to the Palais de Justice, and entering into the hall of the Pas Perdue, he threw himself upon a lawyer, and

seized him by the throat, but was arrested and conducted to prison, and committed to my care the very day of the event. On my first visit next day he was calm and tranquil, without anger or resentment, and had slept well all night, and the same day he painted a portrait. He recollected perfectly well what had happened the evening before at the Palais de Justice, and spoke of it with great coolness; but he had no recollection of the motives, nor the circumstances of his action, and felt no regret for it. He replied to my questions with politeness, without dissimulation, and with the accent of truth: 'I went to the Palais de Justice, as I might have gone anywhere else, to the Palais Royale or the Tuilleries, without plan or intention; and so far from having any resentment towards the lawyer, he was perfectly unknown to me, and I never had any kind of business with any lawyer, and I cannot explain how such a disaster should have happened; it might have taken place anywhere else, and I might have seized upon any other individual.' On my observing to him that a sudden attack of disease might explain the action. 'You may explain it as you like,' he replied; 'I do not feel ill, nor can I give any reason for the event.' During three months which this gentleman passed under my care, he was never insane for an instant, never delirious, and never committed an absurd action. He was polite, obliging to everybody, and amused himself with painting, and reading serious books."

Another much more frequent instance of this insane impulse is met with in suicide. Many cases of self-murder, indeed, are undoubtedly perpetrated by men in a sound state of mind; but in the majority of these unfortunate occurrences, there is clear indication of antecedent insanity, and, in some instances, the insanity would seem to consist mainly in this impulse to self-destruction. This tendency to commit suicide, would appear, in many instances, to be decidedly hereditary. A remarkable instance of this occurred in the United States. There was a family there who inherited insanity from their mother. Two of the sons were twins; they entered the public service, and were remarkably happy in their fortunes. They were noted, too, for their cheerful disposition. At the same period, but in different parts of the country, these twins killed themselves; and they had two sisters, who, although they resisted the evil influence, were strongly tempted, for many years, to do likewise.

It appears certain that season has an influence over suicides; but it is not, as generally supposed, during the gloomy months that such are most frequent, but precisely the reverse, when the weather is hottest and brightest.

Suicide is very often connected with some physical disease of the body; and what is very curious, a disease endemic to Lombardy, and called the *pel-*

lagre, most powerfully predisposes to it. It is confidently affirmed, that one half of those who take this skin disease—for such it is—put a violent end to their own lives.

It is maintained, too, that there is a monomania characterized by an insane impulse to burn; and it is said that this has been developed in consequence of an attack of epilepsy. An irresistible propensity to steal, without any attempt to appropriate the stolen goods, is also now declared to have an existence. Fodéré relates the case of a servant in his own family, who could not help stealing articles belonging to him, although in other respects her conduct was moral and religious, and although she was aware of and deplored the impropriety of her behaviour. He placed her in a lunatic asylum, and after a time again took her into his service, believing her to have recovered. Gradually, and notwithstanding the struggle she made against it, the morbid desire to steal returned, when she was suddenly attacked with decided mania, and died in a paroxysm of it. The propensity has been noticed to come on after a physical injury of the brain.

3. *Disorders of the Feelings and Propensities.*—Cases belonging to this section differ from those of the last mentioned, inasmuch as there is no mental delusion, and a great deal more than one feeling is morbidly perverted. They constitute what has been named by Dr. Pritchard, 'moral insanity.' The following are the most characteristic symptoms of this affection:—

1. *A state of excitement.*—Periods of excitement, often very analogous to, although more permanent than fits of intoxication, come on from time to time.

2. *Absence of all reserve.*—These insane people "talk loudly and coarsely to perfect strangers about their family affairs, their property, and their feelings towards their nearest relatives; complain of ill treatment from one, and testify the most unbounded affection for another, which is liable to be reversed on the slightest caprice, and expose their inmost thoughts to every person indifferently."

3. *Propensity to make extravagant purchases.*—This is often a very striking symptom, and one that may be clearly witnessed in cases where there is no mental hallucination.

4. *A striking regard of veracity, and of moral obligation.*

5. *An irresistible propensity to occasional fits of drinking.*

6. *A proneness to suspicion, and a dislike of relations and friends previously beloved.*—Pritchard remarks that nothing is more common among morally insane persons than the dread of being poisoned, and that it is always a very unfavourable symptom.

4. *Mixed Madness.*—Although the above varieties of insanity are often witnessed, in practice it is usual to find them more or less mixed. There is usually some delusion, some disturbance of the

reasoning faculties, and some disorder of the feelings and propensities.

5. *Dementia.*—When mania (or indeed any of the above forms of insanity) is not recovered from, a state of imbecility or fatuity is often induced. The approach of this is indicated by an increased degree of incoherence in the insane man's ideas. At the same time, his feelings and emotions become much more deadened. This state resembles idiocy, but very widely differs from it in this respect, that while the idiot never has possessed the powers of reasoning, the fatuous man has had them, but lost them. Four steps in dementia are described by Pritchard. At first it is the memory that begins very decidedly to lose its powers; then the reasoning property is lost; next, total inability to comprehend the meaning of any proposition, however simple; and lastly, the merely animal instincts disappear.

III. *Treatment of Insanity.*—This resolves itself into the medical and the moral. The medical treatment indicated at the commencement of many cases of mania will be slightly antiphlogistic, although severely depleting measures are found injurious. This same treatment may be needed on the accession of a paroxysm. Sometimes want of sleep is a distressing symptom, and one that aggravates the others; and, in such a case, the use of opium and other narcotics is proper. In the more chronic states of the disease, an alterative and tonic regimen is generally necessary. It is the moral treatment, however, that is now recognized as being the most important. Until recently, an insane man was looked upon with horror, confined in dirty cells, and kept under control by blows. Now, the man who has lost his reason is treated with humanity, and it is found that moral influences have a very great power in promoting a cure. A part of the good effect that follows a residence in an asylum is partly owing to the removal from the associations that are connected with the origin and progress of the malady, but partly owing to the affected man being under the influence of such occupations and amusements as serve to restore his mind to its healthy tone.

IV. *Prevention of Insanity.*—This is to be hoped for by preventing, as far as possible, the marriage of those strongly predisposed to the disease, particularly with individuals similarly predisposed; to encourage intellectual amusements and pursuits among all classes, particularly the lower, and, by means of a better education, promote the control of the mind over itself.

INTERMITTENT FEVER.—See 'Fever.'

INTESTINAL CONCRETIONS.—Large concretions or bezoars occasionally collect in the intestines of the human species, and of the domesticated animals. They are usually formed by the gradual accumulation of saline matters, and contained in the food around the husk of an oat, which acts as a nucleus.

Sometimes, however, very extraordinary substances are swallowed. There is the case, for example, of the sailor who, in a fit of drunken swagging, swallowed his clasp knife. Finding no ill consequences result, he, from time to time, swallowed a dozen more. For some time no serious consequences followed, but the knives eventually killed him.

INULA HELENIUM, OR ELECAMpane, the root of which has long been used in medicine. It is an indigenous plant. The root is brown externally, white internally, an aromatic, and has a bitter and camphor-like taste. It is an aromatic tonic, and is sometimes used in chronic bronchitis, and in dyspepsia.

IODINE.—This non-metallic element was discovered in 1811 by a saltpetre manufacturer at Paris. It is, perhaps, upon the whole, the most important drug that we possess.

Iodine is obtained, by a complex process, from kelp. It is usually met with in micaceous soft scales, having a metallic lustre, an acrid hot taste, and a peculiar and penetrating odour. It requires 7,000 times its own weight of water to dissolve it; but is much more soluble in alcohol. In its free state (and in the cold) it is characterized by striking a blue colour with starch.

Iodine is a tonic, an alterative (the most effectual that we possess), and a stimulant to most of the organs of secretion. It is used in bronchocele, or Derbyshire neck, and it generally succeeds in reducing this unseemly appendage to the throat. Its action in many cases of scrofula, is decidedly beneficial, particularly in glandular swellings, scrofulous ophthalmias, ulcers, and diseases of the bones. Chronic diseases of various organs, attended with induration and enlargement, very frequently get quite well under its employment. In various chronic skin diseases, too, iodine is beneficial.

IPECACUANHA.—This drug was employed as a secret remedy in Paris about two centuries ago, in cases of dysentery. The secret was purchased by the French government, and ipecacuanha has ever since been a good deal employed in the treatment of various diseased actions. The plant that furnishes it is a native of Brazil, and the officinal part of it is the root. These roots are imported to this country in bales and barrels. They are generally in pieces of three or four inches long, and about the size of a writing quill. Ipecacuanha root contains a peculiar principle called emetina, to which its action seems mainly owing.

Taken in small and frequently repeated doses, ipecacuanha principally increases the secretion from the bronchi. In somewhat larger ones it produces perspiration, and in full ones it acts as an emetic. It is used as an emetic in almost all cases where it is desirable to produce this action, and when the immediate evacuation of the contents of the stomach

is not necessary. In smaller doses ipecacuanha is very much employed in chronic or subacute chest affections, and also generally combined with opium as a sudorific, in those maladies in which such medicines are indicated.

IPOMEEA JALAPA.—See 'Jalap.'

IRIS FLORENTINA.—This produces the orris root of the shops, which is much used for scenting hair and tooth powders.

IRITIS.—Inflammation of the iris is a very serious disease. It is like the inflammations (see inflammation) of the serous membranes, generally characterized by effusion of coagulable lymph. By means of this, the form and appearance of the part are changed, the size of the pupil altered, and the motions of the iris interfered with, or put an end to.

In acute iritis there is generally a good deal of fever and pain, and this latter is attended by intolerance of light. In the more chronic forms, (which are common) none of these symptoms may be very prominent. There is redness in the sclerotic coat, a change of colour in the iris, irregularity of the pupil, or immobility of the iris, along with impaired sight. The redness of the sclerotic causes an inflamed zone which surrounds the edge of the cornea, and which is characteristic of the complaint. The change of colour is produced by the effusion of the lymph, and the contraction of the pupil by a portion of this lymph having bound the iris to an adjoining portion of the eye.

If the inflammation be not checked, it gradually extends to the retina, and in such a case almost invariably destroys that delicate texture, and produces incurable blindness.

The treatment of iritis consists in bloodletting, to reduce the inflammatory state of the system, in administering mercury until salivation is produced, a measure that certainly is of great use in iritis, and in applying belladonna round about the eye. This induces dilatation of the pupil, and thus prevents adhesions forming, or breaks those that are partially formed.

It is important to know, that iritis comes on occasionally as a rheumatic symptom.

IRON.—This metal, called Mars by the alchemists, has been known and used medicinally from a very early period. Indeed it is supposed to be the first mineral substance that ever was administered in disease. The tradition is that its use, or rather the use of its rust, was recommended by a vulture that had been attracted by the carcasses of two bulls, that had been killed for the purpose of obtaining an augury.

Iron is a necessary constituent of the human frame, and is essentially present in the blood. It is also a part of the composition of the vegetables used for food. Its occurrence in the mineral kingdom is too familiar to require notice.

Metallic iron has a whitish grey colour, is capable

of a very high polish, has a peculiar and styptic taste, becomes odorous by being rubbed, is very ductile and tenacious, and two pieces of it at a white heat can be welded together. In its pure form, it has no effects upon the economy; but when combined with oxygen and other substances, it becomes a very powerful and important remedy.

Most of the ferruginous compounds are moderately astringent, and when swallowed diminish the secretions of the whole gastro-intestinal membrane; but it is for their constitutional or remote effects, which are usually termed *chalybeate*, that they are principally used. There is a state of the system, in which the natural and healthy quantity of iron is not present in the blood. This is sometimes in consequence of hæmorrhage, and at others it comes on spontaneously, and without any very well known cause. It is known by the extreme pallor of the face, great feebleness, loss of appetite, palpitations of the heart, and tendency to subcutaneous effusions of dropsy. If in such a state of the system, we administer a therapeutical preparation of iron, the appetite begins to improve, the digestion becomes good, the palpitations cease, the pulse is steady, the face resumes a ruddy appearance, the dropsy disappears, and the muscular strength is restored. In all probability these good effects are owing to the blood obtaining its normal quantity of iron.

Besides being used in such states of the system, the ferruginous preparations are exhibited in many chronic diseases, generally attended with enlargement of the spleen and liver, and also in chronic inorganic affections of the nervous system, as chorea, hysteria, many forms of epilepsy, &c.

ISINGLASS.—This substance is principally obtained from the swimming bladder of the sturgeon; but it is also procured from the intestines of the cod and other fish. It contains a large quantity of gelatine, to which its properties are owing. It is administered as an emollient and nutritive, and for clarifying coffee, wine, &c. Some of the colouring matter of these substances unites with the gelatine, and forms insoluble compounds which precipitate, and in doing so enclose the portions which render the liquid turbid.

Isinglass is also used to form court plaster. To make this substance, a solution of it with some tincture of benzoin is brushed over black sarsenet.

ISIS NOBILIS.—This is the skeleton of a poly-peperous animal. It consists of chalk and a little iron, and is now only used as a tooth power.

ITALIAN JUICE.—See 'Liquorice.'

ITCH.—This is a common and loathsome disease, but which fortunately is very easy of cure, inasmuch as we possess two or three infallible or specific remedies for it.

Itch, or scabies, is a contagious disease. It is most common at the roots of the fingers and thumbs, about the wrists, and if extending to other parts of the

body, also about joints. It is hardly ever known to spread to the head or face. It consists of an eruption, at first vesicular and then papular. These tickle very much, and if scratched usually run on into pustules. Although usually confined to persons of dirty habits, the itch may affect the most cleanly—and it never spontaneously gets better.

The fact is, that the disease is dependent upon a little insect, called the *acorus scabiei*, which is figured in Plate V. This minute animal does not live in the vesicles, but in the extremity of a short furrow that runs from them. If one of these animals be conveyed to the skin of a healthy man, it sets up the itch. The mange in the domesticated animals has probably an analogous origin.

There are two modes in which this itch insect may be killed, and the disease put an end to. Both sulphur and chloride of lime are deadly poisons to it. The mode of applying the sulphur is as follows:—three ounces of sulphur are rubbed up with half a pound of lard, and some scent added to cover as far as possible the unpleasant smell of the brimstone. This ointment is carefully rubbed over the itchy parts, night and morning for three or four days, the patient being enveloped in a flannel robe, which he must never change during the period. At the expiration of this time he must be well washed, and his clothes burned.

The sulphur remedy is very effectual, but very disagreeable. Washing for a few days with a solution of chloride of lime, seems quite as effectual and a far pleasanter mode of cure.

ITCHING.—An uneasy sensation of the surface, nearly allied to pain, and dependent upon some irritation or morbid condition of the skin.

IVORY BLACK, or animal charcoal. This is usually prepared from bones, and is much employed as a deodorizing agent both in pharmacy, and as a dentrifice. It is also sometimes put upon poultices that are to be applied to ulcers having very fetid discharges.

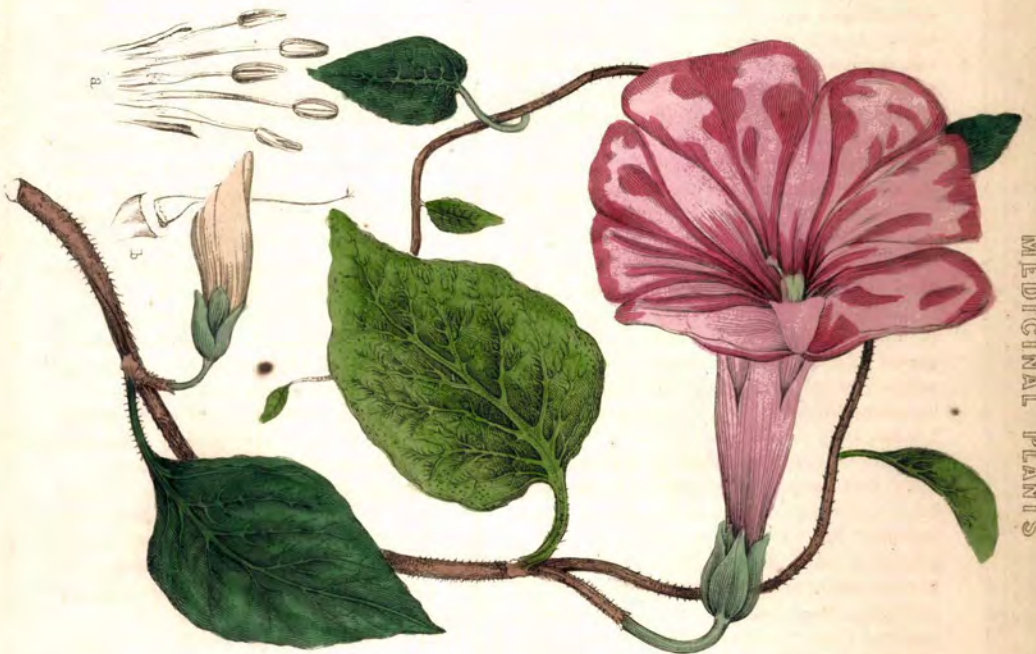
JALAP.—The *Convolvulus Jalapa*, Plate XXV., is a Mexican plant, and was long regarded as the source of the commercial jalap. Another plant, the *Ipomea Purga*, is now generally believed to afford it. At any rate, jalap root is obtained from a plant that grows in the Mexican woods, near Chicanquiaco, and is exported to Europe from the town of Jalapa, whence it derives its name.

The dried tubers of jalap vary in size from that of a nut to that of the fist. They should be heavy, hard, and difficult to powder, and of a deepish yellow colour. Jalap is very apt to be worm-eaten, but this by no means deteriorates its efficacy, as it is not the active principles, but only gum and starch that are so consumed.

Jalap contains a peculiar resin, to which its purgative properties are mainly owing. It is much used as a purgative and vermifuge for children, and



LINUM
USITATISSIMUM
FLAX



CONVOLVULUS
JALAPA
JALAP PLANT



ANTHEMIS
NOBILIS
CHAMOMILE

also in cases of dropsy and cerebral affections in adults. It is rarely given alone, but is usually, when given to children, combined with calomel, and when given to adults, in dropsies, with the bitartrate of potassa. There is an official preparation of this latter admixture called the compound powder of jalap, which has been thought so successful in dropsies that it has been called the *panacea hydropicorum*.

JAMAICA PEPPER.—See 'Pepper.'

JAMES' POWDER.—Dr. James, who died in 1776, prepared a patented medicine which attained great eminence as a sudorific, in fevers and rheumatism; so great, indeed, that the medical men, however unwilling to employ a secret nostrum, were compelled to use it. The specification, in the patent, is worded so ambiguously that the powder cannot be prepared by following its direction. The pharmacopœias, however, contain an imitation of it called the compound powder of antimony, and which is prepared by throwing sesqui-sulphuret of antimony, and hartshorn shavings, into a red-hot crucible. The sulphur is expelled, and antimonious acid, sesqui-oxide of antimony, and antimonite of lime are formed.

Antimonial powder, thus prepared, is white, gritty, and without taste or odour. It—like the true James' powder, which is still manufactured by Dr. James' descendants, or their representatives—is remarkably unequal in its action, being sometimes very active, and at others, quite inert. This depends, probably, upon the varying presence of sesqui-oxide of antimony. Its principal effect is that of a sudorific, and it is still, by some practitioners, much esteemed in febrile and rheumatic complaints. In the former class of cases, it is combined with calomel, and, in the latter, with opium.

JATROPA MANIHOT.—This is the cassava or tapioca tree. It is a native of Brazil. The root of it is large, thick, fleshy, and white, and contains a highly poisonous juice and starch. It is rasped and pressed, to separate this poisonous matter, and the fecula that is left is sold under the name of Brazilian arrowroot, or, when prepared by drying on hot plates, tapioca.

Tapioca is nutritious and easy of digestion, and, boiled in water or milk, and flavoured, or made into puddings, it is much used as an agreeable article of food for the sick and convalescent.

JAUNDICE.—This disease, or *icterus*, as it is technically called, is known at once by an unnatural yellowness of the skin, owing to a quantity of bile which the blood has absorbed. It was called by the ancients the "royal disease," because they held that it was best treated by a life of enjoyment and amusement fit for royalty itself.

The shade of yellow varies a good deal in different cases. The colour, in a person who is pale and fair, is of a bright lemon hue; in those who are

florid it is much deeper; and, in swarthy people, it is often of a greenish shade.

There is an old notion that a jaundiced person sees everything yellow. This is sometimes, but very rarely, the case, and appears to depend upon the bile getting into the conjunctiva, and thus tinging the rays of light, in the same manner that coloured glass does.

Absorption of the bile may clearly be produced by a great many causes that obstruct its due flow into the duodenum. One of the most frequent of these is a biliary calculus which obstructs one of the ducts. The pain that attends the passage of such a concretion is commonly very severe, which is not to be wondered at, when it is considered that while the natural size of the duct is scarcely that of a common quill, the calculus that passes is sometimes as big as a walnut. This pain, which is partly referred to the stomach, and partly to the right side, is not constant, but comes on in paroxysms, and just before the conclusion of a paroxysm there is usually vomiting, preceded by distressing nausea. The matter vomited is commonly very sour, and there is often hiccup. The pulse is not affected. In favourable cases, the stone escapes into the duodenum, and the pain, all at once, ceases to recur.

But it is important to know that gall-stones may impede the excretion of bile, and pass into the duodenum, and yet produce no pain. This may be from the calculus being of no great size, but of an angular shape, and catching in the mucous coat of the gall passages. At any rate, it occasionally happens.

These gall calculi hardly ever form in children, and are most frequent in corpulent people who lead a sedentary life.

Another cause of jaundice is stoppage of the gall passages, from simple spasm. Strangely enough, these are almost always brought on by mental emotions, especially of a sudden and depressing nature. Sudden fits of anger, and still more, of distress and despondency, have thus often induced it.

Of course, too, jaundice may come on in all affections of the liver, particularly when such are attended by enlargement and induration.

The treatment of jaundice is evidently very different in different cases. When it depends upon the passage of gall-stones, the great object is to get rid of these, by means of opium, warm baths, &c.; when upon spasmodic contraction of the biliary passages, from mental emotions, it seems to yield best to the administration of purgatives; and when it depends upon chronic disease of the liver, the remedies must be adapted to the removal or alleviation of this.

In general, jaundice is not a disease of very great consequence, and usually gets better. There is, however, a form of jaundice different in its cause

from all the preceding, and which is, perhaps, uniformly fatal. This does not arise from the bile being re-absorbed into the blood, but from its never being excreted by that fluid. In such a case, the retained bile acts as a narcotic poison, and induces fatal coma.

JESUITS' DROPS.—This is one of the many names of a stimulating application for fresh cuts and injuries. It is also known by the names of commander's balsam, friar's balsam, wound balsam, &c. It is a spirituous solution of benzoin, storax, Tolu balsam, and aloes. Its application to recent cuts seems unnecessary or hurtful, and there are many better stimulating applications to chronic ulcers.

JESUITS' BARK.—Powdered cinchona. See 'Cinchona' and 'Quinine.'

JUNIPERUS COMMUNIS.—This is the common juniper tree or bush. It is an inhabitant of the north of Europe, and grows indigenous in Great Britain, where, however, it prefers chalky soils. The officinal part of it is its berry, or rather its cone; and, on the continent, its wood is also enumerated in the pharmacopœias.

These berries are about the size of a pea, and of a dark purple colour. They are of a sweet and of an agreeable and balsamic odour. They contain a peculiar oil, which may be separated by means of distillation, and to which their properties are owing. Juniper berries are diuretic and carminative. They are not, however, often prescribed; hollands or gin, which contain them, being usually selected for the purpose.

JUNIPERUS SABINE, OR SAVINE.—This is a small bushy shrub that is indigenous in the midland and southern countries of Europe. The officinal parts are the tops, which are violently poisonous. They are, we believe, much used in veterinary practice, and as a topical agent in human, for keeping up a discharge from blisters. For this purpose, the pharmacopœias contain an officinal ointment.

KALI.—This is the Arabic name of a substance possessing alkaline properties. Soda was formerly often called the mineral kali; potassa, the vegetable kali; and ammonia, the volatile kali.

KALI PURUM.—This is the old designation for the fused hydrate of potassa.

KALI TARTARYATUM.—The tartrate of potassa.

KELP.—This is the ash remaining after the burning of seaweed, and contains a large quantity of common salt, some compounds of potassa and iodine, and bromine. It was formerly much used for both soap and glass making, and was extensively manufactured on the shores of Ireland and Scotland, where large incomes were derived by the proprietors from it. Now, however, it is quite superseded for manufacturing purposes by barilla, and is only used as a source of iodine.

KERMES MINERAL.—This is a peculiar form of

oxy-sulphuret of antimony, found native in Saxony and other places, and artificially prepared by boiling the black sulphuret in an alkaline solution. Once it was very much used in medicine, but is now very seldom prescribed, owing to the uncertainty of its action. It is, however, a constituent of Plummer's pill. In small doses, it is alterative, and, in larger, emetic.

KIDNEYS, DISEASE OF.—The most important of these are nephralgia, or violent spasmodic pain in the organ, nephritis, or inflammation, and a peculiar alteration of structure, called Bright's disease of the kidney. The two former demand a passing notice.

As calculi are apt to form, and pass along the ducts of the gall-bladder, so also, and still more frequently, do they congregate together in the kidney, and, getting into its duct, extend it, and excite violent spasm. This is called nephralgia, or, in common language, a fit of gravel. The principal symptoms are pain, generally violent, in one loin, and a good deal of nausea and vomiting.

Sometimes to these is added fever, and then we know that the irritation has excited inflammation, or nephritis. This nephritis may come on from cold; but it very rarely is excited in any other manner than by the presence of a venal calculus. If, during the progress of the inflammation, rigors come on, we may indicate that suppuration has begun, and, in such a case, we may almost always apprehend a fatal event.

The treatment of a case of nephralgia, in which there is no fever, is the liberal administration of opium. When fever is present, bleeding, general and local, the antiphlogistic regimen, and the administration of calomel and opium are indicated.

The tendency to form venal calculi entirely depends upon the imperfect digestion and assimilation of the food, and the prophylactic treatment of them consists in managing the digestive organs. Three kinds of calculi tend to form, the red, or lithic acid, which may be prevented by taking potassa; the white, or phosphate of ammonia, and magnesia, the tendency to form which is best prevented by tonics, acids, and opium; and the oxalic acid calculus, or mulberry calculus, which is rare, and which is best prevented by taking a month's course of nitro-muriatic acid, three or four times in the year.

KING'S EVIL.—This is an old name for scrofula, and was given to it because it was supposed that this disease could be cured by a royal touch. The British sovereigns, down to Queen Anne, regularly touched children affected with this diathesis. Louis XVI. is said to have touched two thousand.

KING'S YELLOW.—Orpiment, or yellow sulphuret of arsenic.

KINO.—About a century ago, an astringent gum was introduced into practice, and was soon adopted

by the pharmacopœias, and called kino. It was supposed, but erroneously, to come from Africa. It is now known to be an Indian production, the concrete exudation of trees, the genera of which are not ascertained. There is, however, a kind that comes from Botany Bay, which is known to be exuded by the *Eucalyptus resinifera*.

East Indian kino occurs in small angular glistening fragments, the larger of which look black, and the smaller reddish. They are brittle, soften in the mouth, have a very astringent taste, and colour the saliva red.

Kino contains a large quantity of tannin, and is a very good astringent.

KINIC ACID.—This is one of the acids present in cinchona bark.

KRAMERIA TRIANDRIA, OR THE RHATANY.—This is a South American tree, the root of which is imported to this country. It contains a considerable quantity of tannin, and is a very good tonic astringent. It is well suited for all chronic discharges and hæmorrhages. It is also much used as a tooth-powder, and it is said to be employed in the manufacture of spurious port wine.

KREASOTE.—See 'Creasote.'

KYAPOOTIE OIL.—See 'Metaleuca.'

LABARRAQUE'S DISINFECTING LIQUID.—Solution of chloride of lime.—See 'Fumigation.'

LABDANUM.—This is the exudation of a cistus, is stimulant, and was formerly an ingredient in several plasters, but is now little used.

LAC.—See 'Milk.'

LACTEALS.—These are so named from containing an opaque, white fluid—chyle—which resembles in its appearance milk (*lac*). They arise from the inner coat of the small intestines, and take up the chyle, as it is separated from the chyme. These lacteal vessels then ramify through the mesentery, and gradually centre into the thoracic duct, where they pour their contents into the blood, and thus compensate that fluid for the waste which it has undergone in nourishing the body.

LACTIC ACID.—See 'Milk.'

LACTUCARIUM.—This substance was introduced into practice as a substitute for opium. It is prepared from the common garden lettuce, which, just before the flower-stalk shoots up, abounds in a milky, bitter juice. By making incisions into the flowering stem, this exudes, and may be dried. It then constitutes lactucarium. Lactucarium, undoubtedly, possesses anodyne and sedative properties, and has not the constipating effect of opium. Neither has it any stimulating effects. Owing to these properties, it was found useful in the cough of consumption, and other pulmonary affections, and to allay nervous irritation and watchfulness; and it probably would be more employed than it is, had it not been for the discovery of morphia, which possesses all its good actions, and is much more certain in its operation.

LAMB.—The flesh of the lamb resembles mutton, but it is more tender, yet more difficult of digestion in this latter respect, bearing the same relation that flesh of animals not come to maturity does to that of those that have.

LANA PHILOSOPHICA.—The old name for oxide of zinc—which see.

LARCH.—This tree yields the Venus turpentine of the shops. This is obtained by boring the trunks of the trees, and adapting to each hole a wooden gutter or spout, which conveys the juice into a tub, where it hardens. It is a thick fluid, with an acrid and very bitter taste, and which, unlike common turpentine, has no tendency to concrete by keeping. It possesses the therapeutical qualities of the other turpentine.

LARD, OR AXUNGE, is the fat of the pig, and is very extensively employed in pharmacy, in the manufacture of ointments. For this purpose it is, owing to its consistency, well qualified; but it is apt, when exposed to the air, to acquire oxygen, form acids, and, in common language, to become rancid.

The lard of the shops is sometimes employed to dress blisters; but as this contains salt, it is very apt to irritate them, and either cotton or spermaceti ointment should be employed for this purpose; or if lard must be taken, the salt should previously be well washed out with water.

LARYNX.—This is the organ of the voice. Its framework is composed of fine cartilages, which can be moved upon each other by means of muscles attached to them, so as to act upon two elastic bands, called the vocal ligaments, which can be thus variously contracted. The air passing across these, in various states of contractions, causes different notes, and these notes or sounds, when combined together, under the influence of the will, constitute language.

The larynx is lined with mucous membrane, which is continuous with that of the gullet and lungs. It is endowed with an exquisite sensibility, and the contact of the smallest portion of a foreign body, as a crumb of bread or a drop of water, excites the most violent and suffocating paroxysms.

LARYNX, ACUTE INFLAMMATION OF, OR LARYNGITIS.—This is a very serious disease, but one, fortunately, not of common occurrence. If, however, a person affected by it be treated properly at an early period of its invasion, it is usually amenable to treatment. If neglected, it may and has proved fatal within twelve hours.

A patient affected with acute laryngitis complains of sore throat, and some marks of inflammation may generally be observed to exist about the fauces, and may lead one to consider it as merely a case of common sore throat. But there is a difficulty of swallowing, and, still more, a difficulty of breathing present, that are not seen in cases of common cynanche. The mode of respiration is peculiar,

too, the act of inspiration being protracted and wheezing.

As the inflammation progresses, pain is felt in the windpipe, a peculiarly husky and harsh cough comes on, and there is hoarseness, or, what is more common, nearly complete loss of speech. The general fever becomes strong; then, as effusion begins to take place in the opening of the windpipe, the breathing is difficult—the distress of the patient gets very great—the countenance of the patient becomes livid and ghastly—he wanders about his apartment—gets the windows thrown open—and, if the disease do not soon abate, dies choked.

Notwithstanding that the indications of suffocation are mainly produced by the inflammatory effusion of serum and lymph, still there is a certain amount of nervous spasm induced, probably of a reflex character.

If seen in time, acute laryngitis should be treated very antiphlogistically. But if these nervous symptoms have got developed, it may be doubted if venesection would not increase the evil. The medicinal treatment of such a case must be mainly based upon the administration of opium; but, in extreme cases, tracheotomy must be tried.

Acute laryngitis is usually caused by exposure to cold and wet.

LARYNX, CHRONIC INFLAMMATION OF.—This is common in the later stages of phthisis. — See 'Phthisis.'

LARYNX, SPASMODIC DISEASE OF.—This is a child's disease. A child attacked by it usually awakens out of its sleep with a cry, and then begins to struggle for breath; its face becomes livid, and, after a considerable struggle, a long inspiration takes place, and the breathing gets easy. It comes on in nervous children, particularly during dentition, and is rarely, although it may be, a fatal disease. Little treatment can be afforded during the paroxysm, and the main thing to do is to amend the general health, particularly the tone of the nervous system.

LAUDANUM.—This is the name bestowed by Paracelsus, and very generally used, upon the tincture of opium. It has a deep brown, red colour, and the peculiar taste and smell of opium.—For its action, see 'Opium;' for its strength, 'Tinctures;' and for the treatment of those who have taken an over-dose, see 'Poisons.'

LAUDANUM, SYDENHAM'S.—This is a solution of opium, &c., in wine, and is much used in ophthalmic practice.—See 'Wines.'

LAUREL.—The *Cerasus laurocerasus*, or cherry-laurel, is a native of Trebizond, and was introduced into Europe in 1576. Its leaves, which have little odour unless bruised, give out, when so treated, the bitter almond odour. Their taste is very bitter and aromatic. A peculiar oil is extracted from them, which is believed not to pre-exist in them, but to

be formed by the action of water upon some of their constituents.

Any way, cherry-laurel water, or cherry-laurel leaves, brought into contact with water, forms a compound that is very poisonous, which acts in the same manner as prussic acid, and is, indeed, probably identical with it. Liqueurs, sweetmeats, &c., flavoured with cherry-laurel, have occasionally proved fatal, the symptoms being a painful sensation at the stomach, sudden insensibility, and death within a few moments. Sometimes there are convulsions. Cherry-laurel water is officinal in one of the pharmacopœias, and may be used in cases of nervous palpitation, &c.; but the diluted prussic acid is far preferable, inasmuch as its strength is more uniform.

LAVENDER.—The *Lavandula vera* is a native of the south of Europe, but is extensively grown in this country for the sake of its flowering heads, and the oil that is obtained from them. Lavender flowers have a bluish-gray colour, and a very fragrant smell. About seventy pounds of the heads yield one pound of oil, having a pale yellow colour, a hot, acid taste, and an agreeable smell.

Lavender is carminative, stomachic, stimulant, and tonic. A spirituous solution of its oil is much employed as a perfume, under the name of lavender water. Lavender water, however, besides lavender, contains oils of bergamot, cloves, rosemary, and roses, benzoic acid, musk, and honey.

LAXATIVES.—Mild purgatives, as sulphur, cream of tartar, castor oil, many of the neutral salts, &c.

LEAD.—This metal was known in the most remote ages of antiquity. It was the Saturn of the alchemists. It occurs abundantly in nature, principally combined with sulphur, constituting galena. It has a bluish-gray colour, much brilliancy, is malleable, but not ductile, and has, when heated, a peculiar odour. Exposed to air, it attracts oxygen, and becomes converted into the oxide of lead, and then oxide of lead unites with the carbonic acid of the atmosphere, the result being carbonate of lead.

Pure distilled water has no action upon metallic lead, but when air and carbonic acid are present (as is the case with all rain water, and most spring water), a crust of carbonate is formed. As carbonate of lead is poisonous, water conveyed through leaden pipes is apt to have a very injurious effect, if drank or used for cooking. It is remarkable, however, that the presence of many neutral salts, such as most spring waters hold in solution, prevents this action; and hence it is that the accidents that have occurred from using water kept in leaden cisterns, or that has flowed through leaden pipes, have been when the water has been rain water, and not spring.

Lead, in its metallic form, has no effect upon the human constitution; but its preparations are very useful, and their general properties, with a list of

the more important of the Saturnine (as they are sometimes called) pharmaceutical compounds, deserve a place.

Compounds of lead, given in *small* doses, act as astringents over almost every secretion of the body. If long continued, a very surprising set of symptoms make their appearance. A violent colic comes on, sometimes preceded, sometimes not, by dyspeptic symptoms. This colic is often accompanied by cramps of the lower extremities, and sometimes actually proves fatal. To this succeeds a peculiar kind of paralysis, or this paralysis comes on without any previous colic. This paralysis affects the upper extremities more than the lower, and the extensor muscles more than the flexor; "so that the hands are generally bent on the arms, which hang dangling by the side."

These effects are never, of course, produced by the physician; but they occur in workmen who are much employed about leaden preparations, as plumbers, potters, and, above all, house-painters, the carbonate of lead being so much employed by these last.

The plan of treatment usually followed in lead colic is to administer opium and castor oil, time about, until the disease disappears. But the best remedy is said to be alum—*i. e.*, the sulphate of alumina and potassa; and it has been inferred, that its action depends upon its sulphuric acid combining with the lead in the intestines, and forming the insoluble and harmless sulphate of lead. The paralysis is best treated by *nux vomica*.

The preparations of lead are used topically, to diminish vascular excitement, and, consequently, to allay irritability; and, combined with opium, they are particularly useful in erysipelas. Internally, they are administered to check excessive secretions, especially of the mucous membrane of the intestines. When they are so given, their effect is watched, and their administration stopped if colicky pains come on. Saturnine preparations are also used in making plasters.

The most important of the preparations of lead are the oxide, or litharge, used for making diachylon plaster, (see 'Plasters,') and for dyeing hair black. The rationale of this last-mentioned process is, that the hair contains sulphur, which, combining with the lead, forms the black sulphuret of lead. Also, the acetate of lead, which is used for administering internally, and also externally; and the diacetate, principally employed in making Goulard water.—See 'Goulard Water.'

Acetate of lead is sometimes used to adulterate port wine. This is a very dangerous fraud.

LEAD, BLACK.—See 'Plumbago.'

LEAMINGTON PRIORS.—This much-frequented watering-place has several springs, one of which contains much sulphate of soda.

LEATHER.—This is formed by combining gela-

tine, as contained in the hides of animals, with tannic acid, the source of the tannic acid usually being oak bark. The tannate of gelatine so formed is impervious to water, and has no tendency to become putrid.

LEECHES.—Leeches have certainly been employed for abstracting blood ever since the time of Themison. The name of the leech, both in the Greek and Latin languages, is derived from its blood-drawing powers. Its official designation is *sanguisuga*, or blood-sucker, from *sanguis* and *sugo*.

The genus *sanguisuga* belongs to the articulated division of the animal kingdom. It is characterised by having the body elongated, the back convex, the belly flat, and both its head and tail end narrowed, before they spread out into suckers. The body consists of about a hundred rings, which, as the animal grows, increase in size, but not in number. It has ten blackish points, or eyes. Its mouth is triradiate, and its three cartilaginous jaws are furnished with numerous cutting teeth.

There are two species of *sanguisuga* used in medicine.

1. *Sanguisuga officinalis*, or *green leech*.—This has a green body, the back marked with six rushy, red, longitudinal stripes; the belly yellowish-green, without spots. It is large, often seven inches in length. It lives in pools in the south of Europe, and is imported, but not in any quantity, from Bourdeaux and Lisbon.

2. *Sanguisuga medicinalis*, or *gray*, or *English leech*.—This has a deep green body, marked with six iron-coloured bands, spotted with black points, and the belly is spotted. It inhabits ponds in England, but is very rare; and it is largely imported from the northern parts of Europe, the place of importation being Hamburg.

Leeches are caught by a net, or by the fishermen wading into the ponds, and allowing the animal to fasten to their legs. They are imported in bags or barrels, and some idea may be formed of the immense quantity that comes from Hamburg, from the fact, that four dealers only in London imported, on an average, 600,000 monthly. In France, leeches are even more extensively used than in this country; and, according to Fée, "it is estimated that 3,000,000 are annually consumed in Paris; and as the population of Paris is to that of the whole of France as one is to thirty-three, it follows that, independently of exportation, 100,000,000 are consumed annually, which is equivalent to three leeches annually for each person. Now, if we estimate the average price at fifty francs per thousand, we shall have the enormous sum of five millions of francs paid for this one article of our *materia medica*."

The stomach of the leech occupies two-thirds of the length of the animal, and is formed of eleven chambers, or cells. These can contain nearly half an ounce of blood, and the animal has the power of

allowing as much nutriment to pass into its alimentary canal as is necessary to preserve its existence; and it is believed that it can take as much at one meal as will last it three years. Consequently, supposing a leech to live for twenty-one years, and few do it, it only need take seven full meals.

It takes about five years ere a leech comes to maturity, and the very young ones are fit for nothing, in a medicinal point of view. They appear not to multiply unless fed upon blood, and it is affirmed that they increase fastest if fed on cows' blood. On this account, the leech-dealers of Bourdeaux drive cattle into their ponds.

Leeches are particularly liable to epidemic diseases, which sometimes destroy them by thousands. Leech-dealers are acquainted with two or three distinct affections that thus devastate them. The only treatment seems to be the immediate separation of the sick from the healthy.

The criterion of a healthy leech is activity in the water, and plumpness when taken out of it. It is evident, however, that even with healthy leeches, different ones, as their sizes vary, will abstract very different quantities of blood. In Prussia, there is a police regulation about them to the following effect:—They are divided into three classes, according to their weight. The members of the first class do not exceed thirty grains; those of the second are more, but do not exceed sixty; while those of the third are from sixty to ninety. Those weighing more than ninety, unless specially prescribed, are not allowed to be used at all. In the prescription, the physician designates which of the three classes he wishes to be employed.

Sometimes, although apparently healthy, leeches cannot be induced to bite. This sometimes depends upon the state of the patient's skin, and the presence of hair upon it has very frequently this effect; and hence the part to which they are to be applied should always be shaved. It would seem that certain electrical conditions of the atmosphere, also, make them unwilling to suck blood. Various plans are fallen upon to induce them, the most common of which is smearing the part to which they are applied with blood or cream. It is common, also, when they are unwilling to fix, to give them a momentary dip in water, which would seem to stimulate them.

When a leech has bitten, and sucked its full, it falls off. It is then common to apply salt to it, which acts as an emetic, and makes it vomit so much of its blood. But the preferable plan is to mechanically force out a portion of the blood, by stripping it with the finger and thumb, leaving in about a third. By so acting, in the course of about a year the leech may be expected to bite again.

Leeches are always getting scarcer and dearer. They were common in England, where they are

now rarely seen; are becoming scarce in France; and the German dealers, "having exhausted all the lakes of Siberia, Bohemia, and other more frequented parts of Europe, the buyers are now rolling, gradually and implacably, eastwards, carrying death and desolation among the leeches in their course, sweeping all before them, until now they have got as far as Pultowa, the pools and swamps of which are yielding them great captures." It becomes, then, of importance to economise the existing stock. One cause of their great mortality is keeping them in jars, with nothing but water. A leech casts its skin about every week, but it cannot get well rid of it when loose, unless it has some hard substance, as sand, or the like, to rub itself against. The plan recommended by Fée is as follows:—

"Into a marble or stone trough, a layer of seven inches of a mixture of moss turf and wood charcoal is to be put, and some small pebbles above it. At one extremity of the trough, and midway between the bottom and the top, place a thin plate of marble, pierced with numerous small holes, upon which there should rest a stratum of moss, firmly compressed by a stratum of pebbles. The trough should be replenished with water, only so high as to slightly moisten the moss and pebbles. A cloth should be kept over the mouth of the trough. This is imitating, as nearly as possible, their natural condition; and the charcoal not only aids in keeping the water sweet, but appears to prevent the leeches being attacked by parasitic animals, to which they are very liable. The water should be changed about once a week, but more frequently in hot weather."

The leech, when applied to the skin, does not make a mere puncture, but saws with its sharp teeth through the skin, and often makes an irritable sore. Having pierced the skin, it sucks in the blood until it is quite distended.

Leeching, applied to children, is analogous to general bloodletting in adults, and produces faintness, and the general shock upon the system. But their action upon adults is subsidiary merely to general bleeding. Local bleeding would appear, however, to have a revulsive effect, even when applied to the skin, over organs where there is no near anastomosis, or communication of blood-vessels.

Leeches, then, are applied to children labouring under inflammatory affections, in place of general bleeding, and to adults in inflammatory affections, in addition to general bleeding, or alone in very slight cases, particularly in cases of congestion, dependent upon chronic disease.

After leeches have fallen off, it is usual to apply a warm poultice, with a view to promote the sanguineous discharge. In children, sometimes the bleeding goes on for too long a time, and occasionally proves fatal. By means of properly applied compression, however, the hæmorrhage may be stopped.

Occasionally, leeches are swallowed, and produce unpleasant results. Salt and water, or wine, both of which are poisonous to the leech, should be immediately swallowed. After the leech has been vomited, the administration of astringents would probably be useful.

LEEK.—This is the *Allium Sativum*, a plant of the alliaceous family, very much employed in many parts of the country as a winter vegetable.

LEGUMEN.—This is an albuminous proximate principle found in peas and beans.

LEMON.—The fruit of the *Citrus Limonum*, before mentioned (see 'Citrus'). The lemon is employed in medicine for the sake of its juice and its peel.

1. *Lemon Juice*.—This is a slightly turbid, very sour fluid, obtained by expression from lemons. It contains nearly two per cent. of citric acid, to which its properties are owing. It is a very powerful antiscorbutic, and, when diluted, a very agreeable and cooling drink. As an antiscorbutic at sea, crystallized citric acid is generally employed; and "those only," says Sir Gilbert Blane, "who have made themselves acquainted with the early part of the naval history of this country, or those who have perused the interesting, popular, and eloquent narrative of Commodore Anson's voyage, can duly appreciate the value of this simple remedy."

As a cooling drink, lemon juice is employed either as lemonade, or in the composition of effervescing draughts. Much of the lemonade of the shops is merely ginger-beer flavoured with a little lemon; but the veritable lemonade is not a fermented drink at all, but prepared by pouring boiling water upon sliced lemons. In hæmorrhages, iced lemonade is often useful as a remedy. The effervescing draught is much used for allaying nausea and vomiting. Either lemon juice or citric acid are used, and mixed with a solution of bicarbonate of potassa, carbonate of potassa, or the sesquicarbonate of ammonia. The following are the relative proportions:—

Citric acid, 14 grains, or Lemon juice, 3½ drachms, with a scruple of bicarbonate of potassa.

Citric acid, 17 grains, or Lemon juice, 4 drachms, with a scruple of carbonate of potassa.

Citric acid, 24 grains, or Lemon juice, 6 drachms, with a scruple of sesquicarbonate of ammonia.

2. *Lemon Peel*.—This is rough, and of a pale yellow colour, which latter, by drying, becomes deeper. Its taste is aromatic and bitter, and its odour strong and peculiar. It contains a bitter matter, and a volatile oil—the oil of lemons. This is obtained by expression or distillation. When pure, it is colourless, limpid, and of a fragrant odour. Lemon peel is much used as an aromatic stomatic, particularly as an adjunct to tonic bitter infusions. The oil is carminative, and is a good deal used for flavouring ointments, pomatums, and lotions.

LEMONS, ESSENTIAL SALT OF.—This contains no lemon at all, but is the binxolate of potassa. It is employed to remove ink-stains from linen.

LENITIVE ELECTUARY.—This is the confection of senna. It consists of senna, figs, coriander, liquorice, prunes, &c., and is a pleasant and effectual purgative.

LEONTODON TARAXACUM, or COMMON DANDELION.—The root of this is employed, in chronic hepatic affections, as a resolvent and tonic. A dandelion coffee is now kept in the shops.

LEPRA.—This is a common scaly skin disease. It occurs in red scaly patches, always of a circular shape, and scattered over different parts of the body. It commonly makes its appearance near the knees or elbows: these patches extend in size, and multiply in number, until they extend along the extremities to the trunk. The disease very seldom attacks the hands.

As the patches begin to get better, the skin assumes its natural condition in the middle of each patch, and gradually goes on improving, so that, just before the lepra gets well, the diseased man has got little rings of leprosy upon him. It is not contagious, nor attended with febrile states of the constitution, but always seems to be dependent upon some disorder of the digestive functions. The treatment consists in endeavouring to remove these; and one of the most effectual means that we can take to do this, consists in the administration of the solution of potassa.

LETTUCE.—This very common salad, besides being a wholesome article of vegetable food, is slightly soporific; and Galen, when annoyed by sleeplessness, took it to his supper. The uses of lactarium, obtained from it, are elsewhere noticed.—See 'Lactarium.'

LEVANT NUT.—One of the names of *Coculus Indicus*, which see.

LICHEN ISLANDICUS.—Iceland moss, which see.

LIGHTNING.—This is the liberation of electricity, from the meeting of two clouds in opposite electrical conditions. A person struck with this, in any intensity, is immediately and thoroughly killed; so much so, indeed, that the coagulation of the blood and the stiffening of the muscles—usually the two last properties manifested by expiring vitality—do not exhibit themselves.

LIME JUICE.—This is the juice of the *Citrus Limonum*, and is analogous to that of the lemon, to which, in the West Indies, it is preferred.

LIME.—This is the oxide of calcium, and occurs most abundantly in nature, generally combined with carbonic acid, forming the carbonate, or chalk. This is heated in a furnace or kiln, by means of which the carbonic acid is expelled, and the lime obtained alone. As it is obtained from the kiln, it is a greyish-white solid, of an acrid alkaline taste, and a very powerful alkaline reaction. If a

small portion of water be thrown on it, some of the water and the lime combine, evolving so much heat as to drive off the rest of the water as steam. Subsequently, the lime falls down as a powder, and is said to be slacked or hydrated.

Water at 60° dissolves nearly twelve per cent. of lime, and this solution is called lime-water, and is, official.

Quicklime is an escharotic, and destroys any animal tissue it comes into contact with. *Lime-water*, if applied to ulcers, diminishes the discharge from them, and is termed a desiccant. Administered internally, lime-water neutralizes any acid present in the stomach, and diminishes the secretions of the alimentary canal. It has also been thought to have an alterative power over diseased glands.

As a caustic, quicklime is now never used in medicine. Lime-water is occasionally prescribed in the acidity of dyspepsia, and is generally given combined with milk. It is also sometimes used in glandular affections. In gravel and lithic acid calculi cases, lime-water certainly alleviates the pain, and was the active ingredient in Mr. Stephen's celebrated remedy, for which parliament gave £5,000. A solution of lime, charged with carbonic acid, is now sold in the shops, and is a convenient mode of taking it in such cases.

Externally, lime-water is applied to ulcers that are secreting a great deal of pus, and particularly to ulcers formed by burns. A mixture of lime-water and linseed oil had long a great reputation in such cases, and was called Carron oil, from being extensively used at the Carron Ironworks.

LIME, CARBONATE OF.—See 'Chalk.'

LIME, PHOSPHATE OF.—This was formerly given in rickets, but its use is now discontinued.

LINIMENT.—This is the pharmaceutical name of an external application, not so thick as an ointment. The pharmacopœias give directions for making several. Of these the following are the most important:—

Ammonia Liniment.—This is made by mixing one ounce of solution of ammonia with two ounces of olive oil. A fluid soap is formed, which is very useful when rubbed over joints affected with chronic rheumatism, in sore throats, neuralgic pains, chronic sprains, and the like. The addition of an ounce of oil of turpentine makes it still more stimulating.

Compound Ammonia Liniment, or Compound Camphor Liniment.—The first of these is made as follows:—Take of

Strong solution of ammonia, Five ounces.

Tincture of camphor,Two ounces.

Spirit of rosemary,One ounce.

Mix them well together.—The other is thus made. Take of

Camphor,Two ounces and a half.

Solution of ammonia, Seven ounces and a half.

Spirit of lavender,A pint.

Mix the ammonia and spirit of lavender, distil a pint with a slow fire; then dissolve the camphor in it.

These are very powerful rubefacients and stimulants, and possess the advantage over the ammonia liniment, that they are not greasy. They are, of course, much dearer.

Soap Liniment, or Opodeldoc.—Take of

Soap,Three ounces.

Camphor,One ounce.

Spirit of rosemary,Sixteen ounces.—Mix.

This is very much used in local pains, rheumatism, &c. Mixed with laudanum, it constitutes *anodyne liniment*.

Compound Mercury Liniment.—Take of

Strong ointment of mer-

cury,Four ounces.

Lard,Four ounces.

Camphor,One ounce.

Rectified spirit,One drachm.

Solution of ammonia ...Four ounces.—Mix.

This is rubbed over chronic tumours, chronic affections of the joints, &c., when it is desired to excite the action of the lymphatics.

Simple Liniment.—Take of

Olive oil,Four parts.

Bleached bees'-wax,One part.

Dissolve the wax in the oil with the aid of gentle heat, and agitate well as the fused mass cools.

This is used to soften the skin, promote the healing of chaps, &c., and is analogous to what is sold as *cold cream*.

Turpentine Liniment.—Take of

Soft soap,Two ounces.

Camphor,One ounce.

Oil of turpentine,Sixteen ounces.

Shake them together, until they are well mixed. This was recommended by Dr. Kentish as a dressing for burns and scalds. The parts were first bathed with warm oil of turpentine or spirit, and then covered with pledgets of lint, dipped in thin liniment. This plan of treating burns was successful, but is now nearly superseded by the application of cotton.

LINSEED.—See 'Flax Plant.'

LINUM USITATISSIMUM.—The linseed or flax plant.

LINUM CATHARTICUM.—This is an indigenous herb, the dried leaves and stem of which are a very good substitute for senna.

LIQUOR.—In the language of pharmacy, this means a solution of a substance in water. Several are directed to be made by the pharmacopœias, and are of great importance. The principal of these are—

Liquor of Ammonia.—This is a solution of am-

monia, and is the form of this medicine almost invariably selected for external application. It is occasionally used, undiluted, as a blister, and it possesses the advantage over an ordinary blister of acting almost immediately. It is more frequently employed, combined with oil, as a counter-irritant, in rheumatic and neuralgic pains, and in internal inflammation as a counter-irritant.

Liquor of Acetate of Ammonia.—This is commonly known by the name of spirit of milderer, and is largely employed in medicine. It is made by adding to a diluted vinegar as much sesquicarbonate of ammonia as will exactly neutralize it. It has a pleasant, cooling taste, and is very often made the basis of mixtures prescribed in fevers and inflammatory complaints. In large doses, it is diaphoretic. It is given in doses of from half an ounce to three or four ounces.

Liquor of Diacetate of Lead.—This is Goulard's extract, and, when diluted with water, forms an evaporating lotion that is very extensively used.

Liquor of Potassa.—This is a very important preparation. It is made by depriving a solution of carbonate of potassa of its carbonic acid, by means of lime. It is a limpid fluid, without colour and odour, having an acrid taste, and feeling soapy when rubbed between the fingers. Undiluted, it is a caustic, but duly mixed with water, it forms the best antacid that we possess. It is given in ordinary cases of heartburn, in the lithic acid diathesis, in chronic skin diseases, chronic rheumatism, &c. Its dose is from ten drops upwards to a drachm. Its taste is almost entirely covered either by sherry or veal broth; and it is said that Chittick's nostrum for the stone was this liquor in this last-mentioned fluid.

Liquor of Arsenite of Potassa.—This is popularly known by the name of Fowler's solution, and is the form in which arsenic is almost invariably administered. It is prepared by dissolving white arsenic and carbonate of potassa in water, and then colouring the liquor by means of compound tincture of lavender, in order to prevent it being mistaken for some less dangerous preparation. It is employed with great success in cases of intermittent fever. It is also used in chronic skin diseases. Its dose is four or five drops, very cautiously increased.

LIQUORICE.—This is the extract of the root of the *Glycyrrhiza glabra*. It is a native of the south of Europe, but is cultivated in England, principally at Mitcham, in Surrey, and Pontefract, in Yorkshire. The extract of liquorice, too, is imported both from Italy and Spain, and is often called Italian or Spanish juice. It has a very sweet taste, and, being very dark-coloured, is sometimes called black sugar. It contains a quantity of starch, and a peculiar kind of sugar, called liquorice sugar, which will not ferment. Liquorice-extract is purified by solution in water, and made up in lozenges (Ponte-

fract cakes), and is employed in tickling coughs, and irritation about the fauces. What is sold in the shops as purified pipe liquorice, is said to be much adulterated.

LISBON.—It used to be a common thing to send consumptive patients to Lisbon. The weather there is, however, liable to fluctuations, and the practice is now almost discontinued.

LISBON DIET DRINK.—See 'Infusions' and 'Decoctions.'

LITHIC ACID DIATHESIS.—This is best counteracted by the exhibition of potassa.—See 'Gravel.'

LITMUS.—This is a blue colour, prepared from the *Leconora tartarea*, a Swedish moss. It is made by the Dutch, and the process for making it is a secret. It occurs in small light cakes, which are soluble both in water and spirit. This blue colour is converted by acids into red, but the colour is restored again by alkalies. Hence it is very much employed in pharmacy, as a test for these two classes of substances. The usual plan of employing it, is to make an infusion of it, and dye bibulous paper in such.

LIVER.—The liver is the organ in which the blood separates a portion of its effete carbon in the form of bile. The lungs are also excretors of carbon; and in animals these two organs bear a relation to one another—the lungs being large when the liver is small, and *vice versa*. In man, the liver is a large solid viscus, of a mottled red and yellow colour, situated at the right side of the abdomen. It is a very large organ; being, in fact, by far the largest gland in the body. Like other abdominal viscera, the liver is invested with peritoneum, which being reflected from it at various parts, forms broad bands that connect it with adjacent organs.

The liver is of a granular structure. In these granules the ducts arise, and these gradually unite into one common one, called the hepatic duct, and this unites with a duct coming from the gall-bladder, which common duct enters the duodenum a few inches distant from the stomach.

This gall-bladder is of a pear-like shape, and is situated on the inferior surface of the right side of the liver. A duct proceeds from it, which, as just mentioned, joins with the hepatic duct. The use of the gall-bladder is to serve as a temporary reservoir for the bile. Many animals have no gall-bladder, and these for the most part are herbivorous ones, in whom the digestion is going constantly on. Bile, it should be observed, besides being an excretion, is the natural stimulus of the intestines; and in those animals in whom the duodenum requires constant stimulation, the bile is poured in continuously.

For the diseases of the liver, see 'Hepatitis,' 'Gall-stones,' 'Jaundice.'

LOBELIA INFLATA.—The common name of this is Indian tobacco, and has long been employed as a

medicine by the American Indians. The dried herb sent to this country is of a greenish-yellow colour, of a nauseous and irritating smell, and a taste very like that of tobacco. In small doses, it is an expectorant and diaphoretic; in full, an emetic; and in still larger, an acro-narcotic poison. It is used in spasmodic asthma, paroxysms of which it sometimes immediately checks; but at other times, again, it has no effect.

LOBSTER.—See 'Astacus.'

LOCKED JAW.—See 'Titanus.'

LOGWOOD.—This is the wood of the *Hæmatoxylin campechianum*, a large tree that grows abundantly in Jamaica. It is only the heart-wood that is sent to this country. Logwood contains a peculiar principle, called hæmatin, which has a somewhat bitter and astringent taste. The decoction of logwood is of a deep red colour. Both it and the extract are justly esteemed on account of their astringent and slightly tonic properties, and are used in hæmorrhages and dysenteries.

LOTION.—This is a fluid pharmaceutical preparation, intended for external use. The most important of them are described under 'Liniments' and 'Liquors.' Two very common mercurial washes are called black and yellow wash. Black wash is prepared by adding about a drachm of calomel to a pint of lime-water; and yellow, by mixing as much lime-water with about half a drachm of corrosive sublimate. Both are stimulating applications, and do well when applied to chronic ulcers.

LOZENGES.—These are composed of medicines mixed up with sugar and other substances. A great variety of these are made by the confectioners, and are much used. Some of them contain very active, and even poisonous drugs; and it is to be lamented that, in the ordinary lozenges of the shops, the quantities of these contained in each lozenge is arbitrary, and unknown to the consumer. Hence, one of the colleges has given directions for the manufacture of the more important lozenges, three of the more important of which are here extracted:—

Morphia Lozenges.—Take of

Muriate of morphia,.....Twenty grains.

Tincture of tolu,.....Half an ounce.

Pure sugar,.....Twenty-five ounces.

Dissolve the muriate of morphia in a little hot water, mix it and the tincture of tolu with the sugar, and, with a sufficiency of mucilage, form a proper mass for making lozenges, each of which should weigh about fifteen grains.

Each of these lozenges contains about one-fortieth of a grain of the muriate of morphia, and, consequently, a dozen or more may be taken in a day. But unless these lozenges are made according to the *Edinburgh pharmacopœia*, they generally contain nearly twice as much morphia.

Morphia and Ipecacuanha Lozenges.—Take of

Muriate of morphia,.....Twenty grains.

Ipecacuanha in fine powder,...One drachm.

Tincture of tolu,.....Half an ounce.

Pure sugar,.....Twenty-five ounces.

Dissolve the muriate in a little hot water, mix it with the tincture, and the ipecacuanha, and the sugar, and, with a sufficiency of mucilage, beat the whole into a proper mass, which is to be divided into fifteen-grain lozenges.

These are very useful in tickling cough.

Opium Lozenges.—Take of

Opium,.....Two drachms.

Tincture of Tolu,.....Half an ounce.

Sirup,.....Eight ounces.

Powder of Gum-arabic, } Of each, five ounces.

Extract of Liquorice,.... }

Triturate the opium with the tincture of tolu, add gradually the sirup and extract, then sprinkle the gum by degrees into the mixture, and beat the whole into a proper mass, which, when sufficiently dried, is to be divided into lozenges of ten grains.

Each lozenge contains one-seventh of a grain of opium, and they should, therefore, be used with caution.

LOVE APPLE.—This is the ripened fruit of the *Solanum lycopersicum*, which, under the name of tomato, is much used in cookery. It only occasionally ripens its fruit in this country.

LUMBAGO is a variety of rheumatism that affects the fleshy mass of the loins on one or both sides, the pain being much increased by motion of the back. In a severe case, every change of posture gives excruciating pain; and, indeed, the patient cannot move himself in his bed without assistance. In milder cases, he can go about, but he is quite unable to bend his back.

Lumbago very often makes its appearance in summer, from cold and damp caught by lying upon the grass. When it comes on from this cause, the patient should be confined to bed, cupped, and have colchicum. If the disease become chronic, counter-irritants and iodine are proper. There is a slight degree of lumbago, very apt to occur in those having the lithic acid diathesis, and best treated by antacids.

LUMBRICUS.—See 'Worms.'

LUNACY.—This is the legal term for insanity, or, at any rate, for that form or forms of it that disqualify an individual from managing his own affairs or going at large. Lunacy also exempts a man from suffering the legal punishment for any crime that he may commit.

LUNATIC ASYLUM.—All lunatic asylums are licensed, and visited by officials appointed for the purpose, and no person can be admitted into them without a certificate, signed by two medical men un-

connected with the asylum, who have visited the supposed insane man *separately*, and who have given a certificate of the insanity. In a case of emergency, however, a lunatic may be received upon the certificate of one medical man; but, in such a case, that of a second must be obtained within eight days.

LUNGS.—Under this head is attempted a general account of the anatomy and offices of these organs, and of the more important diseases that affect them.

The lungs are two in number, situated in the thorax, one on each side. Each has a base that is concave, and corresponds to the thoracic convexity of the diaphragm upon which it rests; an apex which is rounded, and ascends a little into the neck; an external surface, which lies underneath the front of the thorax, and is therefore convex; and an internal surface, situate in the back of the chest, and therefore concave. The right lung is divided into three lobes, and the left into two. The colour of the lungs is bluish-grey, and they are composed of ramifications of bronchi, pulmonary nerves and vessels, absorbents, and cellular tissue. The serous membrane called the pleura envelopes them.

The lungs perform two very important offices; so important, indeed, that if their functions be impeded for two or three minutes, life is, under ordinary circumstances, destroyed. These functions are, the reception into the blood flowing through them of oxygen from the air, and the discharge from it of carbon in the form of carbonic acid.

The bronchi and their ramifications are all lined with mucous membrane, which is continuous with that lining the windpipe and fauces.

Each of the tissues composing the lungs is liable to inflammation. That of the lining membrane is called bronchitis; that of the minute bloodvessels, &c., of its parenchyma, pneumonia; and that of the investing membrane, pleurisy.

Bronchitis is either acute or chronic. Acute bronchitis is generally caused by exposure to cold and damp, and varies very much in different cases with regard to its extent and danger. In ordinary cases, the chest, at first, feels tight and constricted; and there is hoarseness, a feeling of roughness in the windpipe, and a dry cough. Generally, there is a considerable degree of lassitude experienced, with loss of appetite and a little thirst. If at this stage the chest be ausculted, dry rales are heard, indicating a swollen but dry condition of the mucous membrane lining the bronchi and their ramifications. By-and-by the inflamed membrane begins to pour out a quantity of serum. This excites frequent cough, by means of which it is expectorated, and at this stage moist rales are heard, if the ear be applied to the chest. In favourable cases, this discharge becomes quite mucous in its nature, and then diminishes.

A person suffering from a mild attack of bronchitis like this, may have a few leeches applied to

the chest, and then a blister, and take some ipecacuanha, &c. If it be very violent, and the accompanying fever high, general bleeding must be practised.

In some instances, however, and in which the person attacked is either of a weak or broken-up constitution, or when the very minute ramifications of the bronchi are inflamed, and the arterialization of the blood thereby materially impeded, very dangerous symptoms manifest themselves. The difficulty of breathing may become oppressive, the lips and countenance get dusky from the venous blood gorging in them, low delirium makes its appearance, and cold sweats come on that indicate the death that is soon to take place.

When a case like this is apprehended, there must be no general bleeding, but the mainstay must at first be placed upon blisters and tartar-emeti, and subsequently, when the powers of life begin to fail, upon stimulants.

Chronic bronchitis is a very common disease, and is a consequent of the acute form, and often a malady *per se*, besides being induced in the course of a good many other affections. Its most constant symptoms are—cough, with expectoration of unhealthy mucus, and shortness of breath. In severe cases, however, the expectoration may become purulent, the strength greatly fail, the pulse become rapid and feeble, and decided hectic fever make its appearance—every symptom of phthisis, in fact, be developed. But on listening to the sounds of the chest, nothing more than rales can be heard, and none of the symptoms indicative of tubercular disease. This form of acute bronchitis is curable, and the cases that were formerly believed to be cured cases of phthisis, were probably instances of it.

The treatment of such cases consists in counter-irritation, and the administration of tonics and astringents.

Inflammation of the substance of the lungs is named pneumonia, and is a very dangerous disease. It has three well-marked stages—that of mere congestion; that of effusion of lymph, usually called the stage of hepatization; and that of secretion of pus. In the first stage, the swelling of the small air-tubes causes the air to pass through them with a peculiar crackling sound, which is named crepitation, and is quite distinctive of the disease. For particulars regarding this inflammation, see 'Pneumonia.'

The investing membrane of the lungs, the pleura, is also liable to become inflamed, constituting the disease 'Pleurisy,'—which see.

As a consequence of pneumonia, the lungs sometimes mortify, or become gangrenous, and this also takes place as an independent affection; and when this is the case, it is generally in consequence of inhaling noxious gases, and has happened in men

cleaning out sewers and the like. It is known by the extreme fetidness of the breath and expectoration, excessive debility, and a very cadaverous-looking countenance. Occasionally, portions of the gangrenous lung are spit away, and the patient recovers; but this, of course, is a very rare occurrence.

Hæmorrhage from the lungs is a common disease. See 'Hæmoptysis' and 'Phthisis.'

The lungs are liable to a disease called emphysema, which is a very common cause of paroxysms, of difficulty of breathing, or asthma. It consists of dilatation of the air-cells. This is a common disease in the horse, and is known in that animal by the name of broken wind. Emphysema is brought on by any cause that impedes the free exit of the air during expiration, as by inflammatory affections, blowing on wind instruments, tight-lacing, &c. It is characterized by general shortness of breath, and fits of difficulty of breathing.

A full account of tubercular depositions in the lungs, will be found under 'Phthisis.'

The lungs are also, although not often, affected with other malignant growths besides tubercle. Of these, the most remarkable is the black melanosis.

LUPUS.—This fearful disease occurs in scrofulous constitutions. It is a tubercular skin disease, characterized by a tendency to destroy the part on which it occurs, and also the adjoining tissues. In this manner the most dreadful deformities of the face are produced. The only effectual treatment is the early destruction of the part with caustic.

LYMPH.—Properly speaking, this is the name of the fluid contained in the lymphatics, but it is very generally applied to the fibrous matter effused in inflammation.

LYMPHATICS.—The lymphatics are the system of vessels employed in absorbing those parts of the body that have become effete. They consist of minute branched tubes, the extremities of which form a network that is arranged all over the body. From this they converge into a succession of branches of increasing size, and at length terminate in two main trunks, through which the lymph is conveyed into the blood at the right and left sub-clavian veins.

The larger lymphatics all pass through glands.

MACE.—This is the arillus of the nutmeg. It is naturally of a crimson colour, which, by drying in the sun, changes to yellow. As met with in the shops, it is a flat, irregularly-slit, smooth membrane, of an aromatic odour and taste. It contains both a fixed and a volatile oil. In large doses, mace is narcotic, and, in smaller, stimulant and carminative. Mace is much used as a spice in cookery.

MADEIRA.—The climate of Madeira is very mild, the mean temperature of the year not exceeding 68°. In January and December the thermo-

meter rarely falls below 60°, and in the two hottest months, August and September, it is generally about 75°. When, however, the wind blows from the direction of Africa, it gets considerably hotter. It is considered a very excellent place of residence for consumptive patients.

MADEIRA WINE.—Genuine Madeira is a very strong and pure wine, but genuine Madeira is difficult to get, and at present, from the disease that is ravaging the vines in that island, in danger of becoming extinct.

MAGNESIA.—This was first distinguished from lime in 1755, by Dr. Black. It is prepared by driving away the carbonic acid from carbonate of magnesia by means of heat, and is, from this circumstance, often called burnt magnesia. Magnesia is a fine, light, white, colourless, inodorous powder, having an alkaline reaction. It is very slightly soluble in water. It is an antacid and a laxative. An objection to its use is, that it is occasionally apt to congregate in the intestines. It is employed in acidity of the stomach, in lithic acid diathesis, and, as a laxative, in children's diseases.

MAGNESIA, CARBONATE OF.—This is sometimes called white magnesia, and is prepared by decomposing sulphate of magnesia by carbonate of soda. Its actions are much the same as those of magnesia. A very agreeable form of taking it, is a solution of it in water charged with carbonic acid gas. In pharmacy, carbonate of magnesia is employed in the extemporaneous preparation of distilled waters, as they are called. A drachm of any distilled oil is well triturated with a drachm of white magnesia, and then with four pints of distilled water.

MAGNESIA, SULPHATE OF.—This salt was originally procured from the spring at Epsom, whence its popular name of Epsom salts. It is now prepared from dolomite (the carbonate of lime and carbonate of magnesia) and from bittern. In the former case, sulphuric acid is added, and the sulphate of lime and magnesia separated from each other by crystallization.

Epsom salts occur in colourless odourless crystals that have a very bitter taste. They are very soluble in water. They are a mild and very safe antiphlogistic purgative, and, owing to this and their extreme cheapness, they are very much employed. The only objection to them is their very nauseous taste. They should be taken dissolved in a large quantity of water. A little diluted sulphuric acid somewhat disguises their bitterness.

The bitter purging mineral springs, as those of Seidlitz, Epsom, and the Cheltenham pure saline, owe their efficacy to this salt.

MAGNESIUM.—A metallic element discovered by Davy, and the oxide of which is magnesia. It is a shining white metal, and somewhat resembles silver.

MAGNET.—This is a metallic body, possessing

the remarkable property of attracting iron. It has also the power of rendering other bodies magnetic. It is usually an ore of iron, but ores of cobalt and nickel also possess the same properties.

MAGNETISM, ANIMAL.—This is a pretended agent, which those who believe in it think has the power of producing the most powerful and extraordinary effects upon the body and mind of man. It was in the year 1776 that Mesmer, a Sicilian, graduated at Vienna, the subject of his thesis being the influence of the planets upon the human body. He had a friend of the name of Hehl, a jesuit, who had some curious views upon the influence of the magnet, and who constructed some magnets with the idea of using them as therapeutical agents. These magnets were used by Mesmer, as well as by Hehl, and the latter published an account of the experiments that Mesmer instituted. Mesmer maintained that the whole originality belonged to him, and professed great indignation at Hehl claiming any originality. He certainly now pushed his hypothesis upon the subject farther than the jesuit had ever intended, got himself looked upon by the medical and scientific men as an impostor, and was ultimately obliged to quit Vienna.

Mesmer then travelled through Germany and Switzerland, professing to perform extraordinary cures by means of his newly-discovered agent. In 1778 he arrived at Paris, and there his views received extraordinary patronage. A medical man, one d'Eston, became his convert, and, it is said, actually received fees to the amount of £100,000 for treating diseases by means of magnetism. This by no means met the approval of Mesmer, who wished not unnaturally to receive himself the pecuniary recompenses of his supposed discovery, and he applied to the court for a state reward. He obtained the patronage of the queen, and was offered twenty thousand francs a year for himself, and ten thousand francs a year to maintain a proper place for the treatment of his patients, provided that three persons, appointed by the government, should witness and report upon his proceedings.

Mesmer, however, was too wise to expose himself to this scrutiny, and suddenly quitted Paris, and retired to Spa. Here he was followed by several patients of fortune, a hundred of whom agreed to subscribe a sum amounting to nearly £14,000, on condition that he would communicate his doctrine and practice. Upon receiving this he returned to Paris, but immediately quarrelled with his subscribers upon the plea that they were bound to keep to themselves the secrets that they had been instructed in by him. They, however, resisted, and persevered in gratuitously propagating the doctrines and practices of animal magnetism. Mesmer, seeing that no more was to be made of

the matter, left Paris with his £14,000, and never seems to have troubled himself more about animal magnetism.

The following is Mesmer's own account of animal magnetism, and is certainly as clear and intelligible as those of any who have more recently attempted to revive the doctrine:—"Animal magnetism is a fluid universally diffused; it is the medium of a mutual influence between the heavenly bodies, the earth, and animated bodies; it is continuous, so as to leave no void; its subtlety admits of no compression; it is capable of receiving, propagating, communicating all the impressions of motion; it is susceptible of flux and reflux. The animal body experiences the effects of this agent; by insinuating itself into the substance of the nerves, it affects them immediately. There are observed, particularly in the human body, properties analogous to those of the magnet, and in it are discovered poles equally different and opposite. The action and the virtues of animal magnetism may be communicated from one body to other bodies, animate and inanimate. This action takes place at a remote distance, without the aid of any intermediate body; it is reflected by mirrors; communicated, propagated, and augmented by sounds; its virtues may be accumulated, concentrated, transported. Although this fluid is universal, all animal bodies are not equally susceptible of it; there are even some, though a very small number, which have properties so opposite that their very presence destroys all the effects of this fluid on other bodies. Animal magnetism is capable of healing diseases of the nerves immediately, and others mediately. It perfects the action of medicines; it excites and directs salutary crises in such a manner, that the physician may render himself master of them; by its means he knows the state of health of each individual, and judges with certainty of the origin, the nature, and the progress of the most complicated disorders; he prevents their increase, and succeeds in healing them, without, at any time, exposing his patients to dangerous effects or troublesome consequences, whatever be the age, the temperament, or the sex. In animal magnetism, nature presents a universal method of healing and preserving mankind."

At the time of its first introduction, and ever since, when it has been attempted to be revived, the subject of animal magnetism has been investigated, and invariably with the same result, namely, that a great portion of the wonders reported to have occurred under its influence were examples of gross fraud, and that the remainder were quite explicable upon the ascertained facts relative to the phenomena witnessed in individuals of a very mobile nervous temperament.

MALARIA.—The exciting cause of intermittent fever or ague. The following is an abstract of our

knowledge regarding this cause of so much disease and death :—

1. *Conditions necessary for its production.*—In the first place, a certain degree of temperature is necessary for the production of the malaria. It never exists within the arctic circle, and even in warmer climates it is absent during the cold of winter. It is, indeed, supposed only to exist in those localities that have a continuous temperature of at least 60°. As we approach the equator, it becomes far more common, more intense and virulent, and the fever that it excites has more of the continued form than of the decided ague. A certain amount of moisture is also necessary for its origin, and, as a general rule, it only prevails in the vicinity of swamps. Many of these formerly existed in this country, and when they did, intermittent fever and ague were common; now-a-days they are nearly all removed by drainage, and ague is a very uncommon British disease. But not only must there be heat and moisture, but the presence of earth is absolutely indispensable for the production of malaria: and intermittent fever never originates at sea, let the heat be ever so intense.

2. *Effects upon the human body.*—When the malaria is much concentrated, its effects upon the human body are almost instantaneous. Sailors who have been exposed to such have taken intermittent fever during the course of the night to which they have been in contact with it. Usually, however, the poison lies dormant, incubating, as it were, for some weeks or months before the fever manifests itself. Another remarkable fact relating to it is, that people can become, to a certain extent, inured to it. But such, although they do not take ague, certainly have their constitutions very much undermined, and are almost invariably feeble, sickly, and shattered, either dropsies or fluxes commonly carrying them off. Very remarkably, black men are not affected by the malaria.

3. *Regulations regarding its propagation.*—Malaria is a great deal more dangerous by night than by day, and to sleep at night in a malarious district is almost certain to induce the fever. It has often been noticed in men-of-war lying off a malarious coast, that employing the men on land, during the night, was almost certain to induce fever, while they could be sent on shore, in the daytime, with perfect impunity. This fact was well known to Lancisi, the first of the philosophical writers upon malaria, and he admonished those who had to travel in summer through the Pontine Marshes to carefully abstain from doing so by night. "Though the passage requires but six or eight hours, there are numerous instances of travellers, who, in consequence of their having crossed these fens during the night, have been attacked with violent and mortal fevers."

Then the malaria only extends a short distance

from the ground. Thus the lower rooms of a house may be poisoned with it, while the upper ones are quite wholesome. "In all malarious seasons and countries," says Dr. Ferguson, "the inhabitants of ground floors are uniformly affected in a greater proportion than those of the upper stories. According to official returns, during the last sickly season at Barbadoes, the proportion of those taken ill with the fever, in the lower apartments of the barracks, exceeded that of the upper by one-third, throughout the whole course of the epidemic. At the same time, it was observed that the deep ditches of the fort, although they contained no water—and still more, the deep ravines of rivers and water-courses—abounded with the malarious poison."

The malaria is distinctly moveable by the wind. A very striking instance of this was long ago narrated by Lancisi. A party of thirty ladies and gentlemen were boating at the mouth of the Tiber. Suddenly the wind shifted to the south, and blew over a malarious tract of ground situated to the windward of them, and thirty-nine caught the ague. But if this malaria pass over trees, it seems to be absorbed, or somehow rendered innocuous by them. This, however, renders it particularly unsafe to live or to stop long near trees in a malarious district. Some have maintained that the origin of sacred groves was in consequence of this protective power of trees in absorbing malaria. Water has a similar effect, and the crew of a ship situated no very great distance from the source of a malaria are not affected by it. Lastly, cultivation gradually diminishes the evil influence of malaria, and this, probably, in consequence of changing the climate, and the amount of rain which falls, a subject into which it would be improper here to enter.

MALE FERN.—This is the *Aspidium Felix Mas* of the pharmacopœias. It is an indigenous fern, common enough in woods and shady places. The dried root is the officinal part, and is gathered in July or August; the black or outside portion of it is then removed, and the remainder, which is of a yellowish colour, reduced to powder.

Male fern contains a peculiar oil, to which its medicinal properties are mainly, if not entirely owing. It has for long been employed as an anthelmintic in cases of tapeworm, but, at present, either oil of turpentine or pomegranate are generally substituted for it.

MALE ORCHIS.—This indigenous plant is one of the sources of salop, a beverage that now appears to be entirely banished by coffee.

MALIC ACID.—The acid found in apples and other fruits.

MALICONTIUM.—The rind of the fruit of the pomegranate.

MALT.—This is barley made to germinate, so as to convert its starch first into dextrine, and then

into sugar, and its vitality next destroyed by means of heat. Wort, or the unfermented infusion of malt, was formerly a good deal used on board ship in cases of scurvy, and also as a prophylactic against that disorder. It is still occasionally used in chronic scrofulous affections. It is made by boiling three ounces of malt in a quart of water.

Malt liquors are prepared by fermenting a solution of malt, and adding hops to the mixture. See 'Porter,' &c.

This fermentation is excited by means of yeast or balm, a large additional quantity of which is generated in the process. This yeast is applied externally, and sometimes administered internally. It is occasionally given in typhus fever and typhoid diseases, and is considered to give relief, in particular, to the flatulent distension that is sometimes so distressing in these affections. Externally, it is applied to fetid and sloughing sores, and it certainly destroys the fetor, and seems to cause the slough to be thrown off, but it often gives considerable pain. The manner in which it is directed to be applied by the colleges is, to mix flour and yeast, and thereby induce the panary fermentation, in which state the mixture is to be applied. Its efficacy is probably owing to the carbonic acid gas which is evolved.

MALVA SYLVESTRIS, or COMMON MALLOW.—This plant has been employed in medicine for a very long period, owing to the mucilage with which it abounds. It is indigenous, and grows by hedges and roadsides. It is emollient and demulcent, and its decoction is drank in cases of irritable mucous membranes, and also applied as a fomentation, generally combined with chamomile flowers, in external inflammations.

The marsh mallow is an allied plant, and is likewise indigenous, abounding in marshes, particularly in those near the sea. It has been analyzed and found to contain, besides a large quantity of mucilage and starch, a peculiar principle common to it and to the asparagus, and which has been named asparagin. It is used in this country in similar cases to those in which the common mallow is. On the Continent it is a very favourite demulcent, and the *pastilles* and *paté de guimauve* are very much employed in pectoral affections.

MAMMARY GLAND.—This organ is peculiar to the highest class of animals, the members of which are principally distinguished by feeding their young with milk, which is secreted by this very gland. A mammary gland is composed of ramified ducts, which open on the surface of a nipple, or teat, by a very minute orifice. In some animals, as in cows, there is only one orifice in each teat, but in the human species there are several. Each orifice leads into a canal, which soon expands into tortuous branches in the breast or udder, and on the walls of which the blood secretes the milk. When the young animal seizes with its mouth the nipple or teat, and

sucks, it causes a vacuum, and the surrounding air, pressing gently on the gland, forces the milk into the mouth.

The mammary gland, in females, is liable to many severe diseases, as cancer, abscess, &c. In the male, the rudiment only of the gland exists, although instances have been known of men suckling children.

MAN.—The human species differs in many respects from all other animals. Man alone is adapted for the erect posture. If we examine the skeleton, we see that the joint where the head unites to the spine, is so constructed that the head will scarcely be at an angle with the backbone. Then the face of man is immediately below his brain, instead of, as in other animals, anterior to it—a form exactly adapted to the erect attitude. The backbone, too, is so arranged that, when in the erect posture, a vertical line drawn from its summit falls exactly on the centre of its base. The pelvis, instead of, as in animals, forming an angle with the backbone, is continuous with it. The lower extremities of man, again, are so long, that if he went on all-fours, he would not rest upon his feet, but upon his knees. This is principally owing to the greater development of the thigh-bone. In looking at an ape or monkey, for example, owing to the shortness of their thigh-bones, their fingers nearly reach to the ground, while those of a man can rarely reach lower than the middle of the thigh. Lastly, the size and construction of the foot are evidently such as are suited for the erect posture. It is owing to the form and size of the human foot, that man alone, of all animals, can stand on one leg. The heel-bone also is so situated, that it comes into complete contact with the ground. The apes have their heel-bone more or less raised from the ground, and when they balance themselves upon their lower extremities, they touch the ground with the outside only of the foot, while, in the animals still lower, the heel-bone is far away removed from the ground, and the animal stands on the extremities of its toes. The muscles of the human leg are so arranged as to suit the upright position, and it is owing to this arrangement that they are gathered into a heap, as it were, at the calf of the leg. No other animal has a calf to its leg.

Man, besides the erect posture, is distinguished by being two-handed. Monkeys are four-handed, and the inner toe of their feet (which is not the biggest but the least), is separated from the rest of the toes, so that it can be opposed to the rest, after the manner of a thumb. Hence this class of animals can grasp and lift things with their feet as well as with their hands. In the hoofed animals, all four extremities are organs of support only; and in carnivora, all four are equally organs of support and prehension; while in man, the two hands are organs of prehension, and the two feet of support alone.

Another physical peculiarity of man is, that his

teeth are nearly equal in length, and all approximate together. The apes that most resemble mankind have their canine teeth much longer than the other teeth, and there is an interval in the line of teeth of each jaw, to receive the projecting canine teeth of the other.

A farther peculiarity of man, is his total want of means of offence and defence, and of natural clothing.

We should add to these (what, however, man shares with the dog and the pig) the ability of the human species to exist and be healthy in almost every part of the globe, and to exist on all kinds of food.

For the physical differences that exist between the different races of men, see 'Varieties of Man.'

MANDRAGORA, or **MANDRAKE**.—This is now never used in regular medicine, although it is probable that it is a narcotic of considerable strength. What is sold in herb shops as mandrake, is the root of the common black bryony.

MANGANESE.—A metallic element.

MANGANESE, BINOXIDE OF.—This is found native in Cornwall, Aberdeenshire, and other places in Great Britain. It produces, when gradually taken into the system, a paralysis in the manner that lead does, but it does not, like preparations of that metal, induce colic. Some of the men employed in grinding it in the Chemical Works of the Messrs. Tennant were thus affected by it. It has been used internally and externally in various skin diseases, but is very rarely employed in medicine. It is of importance in the arts, being used by the bleacher in making chlorine, and by the glass-maker and the potter to colour glass and earthenware.

MANGEL WURZEL, or **FIELD BEET**.—This is now extensively cultivated for feeding cattle, and as a source of sugar.

MANGO.—The mango tree is of Asiatic origin, but is also cultivated in our West Indian islands on account of its fruit, which is almost an essential food in very hot countries. This fruit is either eaten raw or preserved with sugar. The unripe fruit is also used as a pickle.

MANGOSTEIN.—The *Garcinia Mangostana* produces the celebrated Malay fruit, said to be the most delicate fruit in the world. It grows to about the size of an orange, and is white, juicy, and transparent. It is surrounded by a rind, which is thick, firm, and of a crimson colour. This is a powerful astringent, and much used in cases of dysentery, and also in sore throats as a gargle.

MANIA.—See 'Insanity.'

MANNA.—The manna of the shops is the concrete juice of the *Fraginus Ornus*, a species of ash-tree that is common in the south of Europe. This juice exudes spontaneously in warm dry weather, and concretes upon the bark of the tree, but it is usually obtained by making incisions into the bark. Each

of these incisions is about two inches long, and it is said to flow at first as a clear limpid fluid. It is probably some diseased action of the ash, perhaps caused by the bite of an insect, that causes its secretion.

Several varieties of manna are known in commerce. The finest of these is called flake manna, and consists of pieces of from one to six inches long, of a white or yellowish colour, and of an unpleasant sweetish taste. Inferior kinds are of a dirty yellow-brown colour. Manna is imported in pretty considerable quantities to this country from Italy.

Manna contains a peculiar kind of sugar called mannite, which is white, crystalline, and inodorous, but which differs from common sugar in not being able to undergo the alcoholic fermentation. In small doses manna is nutritive, and in larger ones laxative, and was formerly much employed as an aperient for children. At present, however, magnesia has to a considerable extent superseded it. On account of its sweetness, it is a good addition to the purgative draughts of young patients.

MARANTA ARUNDINACEA.—The Indian arrow-root. This plant was brought from the island of Dominica to Barbadoes, and thence to Jamaica, where it has since been extensively cultivated. The tubers are dug up when about a year old, and well washed in water, and next beaten to a pulp. This pulp is then thrown into a tub of water, and the fibrous parts rubbed out by the hands and thrown away. The milky liquor that is left is suffered to settle, and the water cleared off, upon which a white mass falls to the bottom, which is dried in the sun, and then constitutes arrow-root, or, at any rate, West Indian arrow-root.

Arrow-root consists almost entirely of starch, and is nutritious and digestible. It is much used as an article of diet, particularly for invalids. It is very generally mixed with potato-starch, which, however, is scarcely an adulteration, the one being as wholesome as the other.

MARASMUS, or emaciation, is the name given by the older medical writers to wasting or consumption of the body, in cases where no cause was plainly to be distinguished. It is now often applied to the wasting of children, who are labouring under disease of the mesenteric glands.

MARBLE.—Carbonate of lime.

MARGARINE.—One of the constituents of fat.

MARINE ACID.—The old name of muriatic or hydrochloric acid.

MARJORAM, COMMON.—This is an indigenous herb, which has an aromatic peculiar odour, and a warm pungent taste. It contains a volatile oil, which is obtained by submitting an infusion of the herb to distillation. This oil is used as an application to carious teeth in toothache, and mixed with olive oil as a stimulating embrocation.

MARJORAM, SWEET.—This, too, contains a pecu-

liar oil, which is aromatic and tonic. It is, although officinal, more used by the cook than the apothecary. It is, however, occasionally employed as an errhine.

MARMALADE.—Bitter oranges preserved with sugar.

MARROW.—This is the only substance contained in the interior of the long bones.

MARRUBIUM.—Horehound—which see.

MARSH MALLOW.—See 'Mallow.'

MARSH TREFOIL.—This is the leaves of the *Menyanthes trifoliata*, which, in moderate doses, are tonic, but in larger, cathartic and emetic. Although officinal, it is not much used in this country, but it is very extensively employed by German brewers as a substitute for hops.

MASSICOT.—Yellow oxide of lead.

MASTICH.—This is a resin which is extracted from the trunk and branches of the *Pistacia Lentiscus*, by means of incision. The tree grows in the Levant, and especially in the island of Chios. The fluid that exudes soon concretes into semitransparent brittle beans, that have a rather agreeable odour and taste. Thrown upon hot coals, the smell is very much developed.

Mastich contains two particular kinds of resins. It is a stimulant and antispasmodic, but is not now much used. It is a compound of the eau de luce, or compound tincture of ammonia, and is also a constituent of an old-fashioned prescription for dinner pills, which is still sometimes asked for. These consist of

Aloes,.....Six drachms.

Mastic,.....Two drachms.

Red Roses,.....Two drachms.

Sirup of Wormwood,.....As much as will make a mass, which is to be divided into five-grain pills.

MATERIA MEDICA.—This is the branch of medical science directed to the consideration of remedies, or medicines. It includes a knowledge of their properties and natural history, and also the means of preparing them, or *pharmacy*. See 'Pharmacy.'

MATRASS.—This is a glass vessel employed in chemistry and pharmacy, for digesting, boiling, and distilling.

MEADOW SAFFRON.—This is the *Colchicum autumnale* of botanists, and is indigenous in rich meadows of England. The bulb and the seeds are both employed in medicine, and are very powerful therapeutical agents. Both contain a peculiar principle, called Veratria.

Taken in small and repeated doses, colchicum increases the action of most of the secreting organs; and these, if continued, produce vomiting and diarrhoea. It also possesses a decidedly sedative action. It is also, perhaps, a specific in the gout and the rheumatism. It would not appear to be efficacious in the

latter of these diseases, until it has been taken long enough to bring on the vomiting, &c.; but when these do occur, the pain and swelling very often abate.

MEASLES.—This is the *Rubeola* of nosologists. It is an infectious febrile disease, attended by an eruption on the skin, which most people pass through once in their lives, and which rarely attacks the same individual twice.

It begins with the usual symptoms of fever, loss of appetite, thirst, and shiverings. These are followed by heat of skin, acceleration of pulse, &c. Very generally, too, the mucous membranes are affected, particularly those of the air passages. The eyes usually become congested and watery, the eyelids swell, the throat gets sore, and the chest gets involved. In consequence of this there is much sneezing, running from the nose, and cough.

In the majority of cases, about four days after this fever has commenced, the peculiar eruption of measles makes its appearance. This eruption consists of minute papule, which coalesce into blotches, that almost always assume a crescentic or horse-shoe form, the skin lying between the sides of the shoe being of its natural colour. It appears first on the face, neck, and arms (often first breaking out on the forehead), and gradually extends to the other parts of the body, visiting the legs last. In three days it begins to decline, becoming browner as it fades. In ordinary cases, from its first appearance on the brow to the departure of it from the legs, six or seven days usually elapse. If the finger be passed over the eruption, it may be felt to be slightly elevated above the rest of the skin, and, as it disappears, the skin where it was is covered with a small dry scurf.

The fever does not usually abate when the rash breaks out.

Like almost all the contagious fevers, measles at times becomes epidemic; and in some epidemics the fever assumes a very typhoid form, and then becomes very fatal. In common cases, the measles is not a very dangerous affection; and when it is so, it is (excepting in these typhoid cases) owing to the pectoral symptoms becoming alarming. Sometimes these go on to absolute pneumonia; and in scrofulous children, who apparently recover from the attack, the development of tubercles is very much favoured.

The treatment of measles is plain. In ordinary cases, nothing is needed but confining the child (for most people take measles when children) to his bed. Care should always be taken, on account of the danger of pectoral symptoms, to avoid cold draughts. The antiphlogistic regimen is always proper, and very generally some purgative medicine may, at the outset, be advantageously administered. The great matter then is to watch for the appearance of pulmonary implications; and if such occur, the patient

must, if the constitution seems strong enough, be leeches and blistered, and take tartar-emetic.

In a great many of the most alarming cases, however, no depletion can be borne, and the only chance consists in the administration of stimulants. In such instances, however, a blister may usually be usefully employed. Children suffering from measles, however, are very apt to suffer from sores produced by blisters, and it is always prudent, in such cases, to keep on the blister only three or four hours, and then apply a poultice, which will generally cause it to rise.

Great pains should be taken to protect the patient during convalescence, from the injurious effects of cold.

MEDICINES.—A great many classifications of medicines have been proposed. The following, by the late Dr. Pereira, is one of the best.

Class I.—Cerebro-spinants.—Under this head is included all those remedies, the primary effect of which is to produce a disorder of some of the functions of the cerebro-spinal system, as sleep, insensibility, delirium, convulsions, &c.

Class II.—Stimulants.—This class takes in all the remedies that increase the vital activity of an organ, or of the whole system.

Class III.—Tonics.—Under this denomination is included all those therapeutical agents which, if repeatedly administered, in relaxed and debilitated conditions of the system, increase the tonicity of the whole body, and augment the vigour with which the various vital functions are carried on. Under this head, Pereira includes astringents.

Class IV.—Emollients.—The substances of this class diminish the tonicity of the whole body, and thereby occasion local relaxation and weakness. They are, therefore, in their operation, diametrically opposite to tonics; they relax, soften, and swell the tissues, and render them more flexible. They diminish the heat, tension, and pain of the inflamed parts, and, applied early, tend to promote resolution. Later, in an inflammation, they facilitate the process of suppuration. They also have a relaxing effect upon the muscular fibre, and hence are used to relieve spasm.

Class V.—Refrigerants.—Under this head are included all those remedies that diminish the temperature of the body when it is preternaturally heated, as the mineral acids, certain neutral salts, &c.

Class VI.—Evacuants.—These remedies increase the amount of secretions from different parts of the body. The most important of these are diaphoretics, errhines, expectorants, emetics, cathartics, and diuretics.

Class VII.—Caustics.—These bodies act chemically.

Class VIII.—Rubefacients and Vesicants.—These are the agents that, when applied to the skin,

produce redness, and, if kept close to it long enough, inflammation, with effusion of serum.

Class IX.—Acids and Alkalies.—The action of these is chemical.

MEGRIM.—Headache on one side, or hemi-crania.

MELANCHOLY.—See 'Insanity' and 'Hypochondriasis.'

MELANA.—See 'Hæmatemesis.'

MELALEUCA MINOR.—This tree was, and is yet, known by the name of kayer-puti, which means whole wood. It is an inhabitant of the Moluccas. The leaves of it are gathered on a very hot day, and placed in a sack, where they are allowed to begin to ferment. They are then macerated in water, and distilled. Two sackfuls yield about three drachms of an essential oil, which is imported under the name of kayapootic or cajaputi oil.

Cajaputi oil comes to this country in bottles. Its colour is greenish; it is transparent, limpid, and has a peculiar aromatic odour and taste. It is stated to be composed as follows:—

Carbon,	77.92
Hydrogen,	11.69
Oxygen,	10.39

100.00

Cajaputi oil is a very powerful antispasmodic and diffusible stimulant. It has also a stimulating action upon the skin. Of all the essential oils, it appears to have the strongest influence over the nervous system. It is used in spasms and flatulent colic, in hysteria and asthma, and, at one time, was greatly extolled (apparently improperly so) in epidemic cholera. It is lamentable to think that, when this was the case, and the cajaputi oil was in great demand, a spurious article, made of oil of rosemary, camphor, and cardamoms, was substituted for it, and sold as genuine cajaputi oil.

MELANOSIS.—This is the name of a malignant deposit, usually of a black colour. It is found most frequently in the adipose tissue. It is deposited occasionally in compound organs, as in the liver, the lungs, the eye, and the brain. It is also occasionally present in serous membranes.

Melanosis generally occurs as a tumour, which may vary in size from a pin's head to that of an orange. When it is deposited in one tissue, it very soon makes its appearance in another. After some time, these black tumours suppurate and discharge, very much after the manner of tubercles, and, from their exhausting effect, destroy life.

There is no manner of ascertaining the existence of melanosis in internal organs during life, and, if there were, no plan of treatment known.

MELISSA OFFICINALIS, or the **COMMON BALM**.—This familiar herb was formerly much more employed than it is now. It is an inhabitant of France, but is cultivated in our gardens for the

sake of its leaves, which have a strong and agreeable odour, like that of lemons, and a bitter and aromatic taste. They are tonic and carminative, and the infusion of them, or balm tea, may be given in nervous affections and stomachic complaints.

MELON.—This is an herbaceous succulent climbing annual, that has been cultivated from time immemorial in the East for its fruit, which is there an article of necessity, and in this country, for some time, as a luxury. In very hot countries, during the great heat and drought of summer, almost all the fresh vegetables disappear, and then it is that the melon becomes so necessary.

MEMBRANE.—This is an expansion of any tissue in a thin and wide layer. For a considerable period, all membranes have been arranged into serous, mucous, and fibrous, and these not only differ from one another in their physical appearances and properties, but in the diseases to which they are liable.

Serous membranes are so named on account of the serum with which they are kept moist. These always form shut sacs, and, with the single exception of the conjunctiva of the eye, are present where there is friction between an organ and the part that contains it. Hence, the brain, the lungs, the heart, and the intestines, are all invested by serous membranes. They are well adapted for obviating the evil effects of pressure, owing to their smooth, polished, and constantly moistened surfaces. The membrane that lines joints, and the inner coat of the bloodvessels, also very closely approximate to the character of serous membranes. All the serous membranes, when inflamed, have a strong tendency to effuse lymph.

Mucous membranes are named from their peculiar secretion, mucus. While the serous membranes envelop all the organs contained in parts where there is danger of mutual friction, the mucous line those canals and cavities of the body to which the air can have access, as the nostrils, the mouth, the bronchi, and the intestinal canal. Mucous membranes, when inflamed, are very apt to exude pus.

Fibrous membranes are those which are chiefly formed of tendinous tissues. They form cavities for the protection of important organs, and envelop and strengthen parts. When inflamed, they tend to effuse serum.

MENISPERMUM PALMATUM.—This is one of the names of the plant that furnishes the calumba root of the pharmacopœias. This plant is a native of Mozambique, where the inhabitants dig up the roots and dry them in the sun. These roots come to this country in flat circular pieces, of from half an inch to three inches in diameter, and from one to four lines in thickness. They contain a peculiar bitter principle. Calumba root is much esteemed, and extensively used as a tonic. It is prescribed in a languid state of the stomach, accompanied with

debility, and is thought particularly useful in dyspepsia, attended by vomiting. It is also much esteemed in chronic diarrhoeas.

MENTHA VIRIDIS, or SPEARMINT.—This is indigenous in Britain, and is found in marshy places. It is also cultivated as a salad and pot-herb, and also for its medicinal properties. It is aromatic, carminative, and tonic. It is, however, feebler than peppermint, which, in prescriptions, is usually substituted for it. The essential oil, on which its properties mainly depend, is sometimes separated from it by distillation.

MENTHA PIPERITA, or PEPPERMINT.—This was introduced into medical practice about a hundred years ago, and has gradually displaced spearmint. It is indigenous in our marshes, but is largely cultivated by herbalists. The whole plant is officinal. It has a peculiar aromatic odour, and a warm, bitter, and burning taste, which, however, is followed by a sensation of coolness when air is drawn into the mouth. These properties depend upon a volatile oil, which is separated by distillation.

Peppermint is very much employed as a carminative. Peppermint water, spirit, and oil are frequently added to mixtures and pills; and the infusion of it, a spirituous solution, and lozenges impregnated with it, are extensively consumed.

MENTHA PULEGIUM, or PENNYROYAL.—This mint has been used medicinally ever since the days of Hippocrates. It is an indigenous plant, and grows upon the borders of streams. Pennyroyal has a strong and peculiar odour and taste, both of which depend upon the presence of an essential oil. It is used, but not much at present, as a carminative, and as an antispasmodic in hysteric affections.

MERCURIAL DISEASE.—See 'Hydrargyrium.'

MERCURIAL PILLS.—See 'Pills.'

MERCURIUS DULCIS.—This, or mild mercury, is one of the many names that calomel, or the chloride of mercury, has received.

MERCURIUS SUBLIMATUS.—This, in like manner, is one of the names of the very poisonous bichloride of mercury.

MERCURY, or QUICKSILVER.—This metal was known to the ancients, but was not used medicinally until the time of the Arabians, and even they only ventured to apply it externally. It was first administered internally by that strange empiric, Paracelsus. Metallic or liquid mercury has no action on the human economy, but probably all of the mercurial compounds have, more or less, a poisonous nature. Applied externally, they are stimulants or irritants. Given internally, in small and repeated doses, they increase the secretions, stimulate the lymphatic system, and act as general alteratives. When used in somewhat larger doses, they particularly stimulate the salivary glands, and produce salivation. In excessive doses, mercurials produce acute poisoning, inflammation of

the intestines, and sometimes cerebral disorder is set up.

Mercurials are much used as alteratives, particularly in disorders of the digestive functions and in chronic skin diseases. Some, as blue pill and calomel, are much employed as purgatives, either alone or as adjuncts to other purgatives. They are also used in dropsies to promote absorption, and a very common mode of treating inflammation is to produce salivation, by means of administering calomel and opium pills.

Occasionally, during the administration of mercurials, a peculiar disease is induced. This is described under the head of 'Hydrargyrium.'

A mercurial plaster is sometimes applied to glandular enlargements. But the most used of the external applications of mercury is the golden ointment, or ointment of the nitrate of mercury. Duly diluted, it is a useful stimulating application.

Chloride of mercury, or calomel, is very much employed as a purgative and alterative. The bichloride, or corrosive sublimate, is a most virulent poison, and little employed in regular practice. It is, nevertheless, believed to form the basis of a number of quack medicines.

MESENTERY.—This is the membrane by means of which the intestines are attached to the posterior wall of the abdomen. It consists of a double layer of cellular and adipose tissue, attached to the abdominal wall by a small origin, and then expanding like a fan, to be attached to the entire length of the small intestines. Between its layers, the arteries and veins of the intestines pass, and also the lacteals. It also contains a number of glands, which, in scrofulous constitutions, particularly in children, are liable to become the seat of tubercular deposition.

METAGALLIC ACID.—This is formed when gallic acid is heated up to 480°.

METAL.—An elementary body that conducts heat and electricity, and has a peculiar shining appearance, called the metallic lustre. Metals, in a pure and uncombined form, have no action upon the animal economy, but many of their compounds are of great activity and importance.

METASTASIS.—The translation or shifting of a disease from one part of the body to another. When the gout suddenly disappears from the toe, and violent pain in the stomach comes on, we have an instance of this.

MEZEREUM.—This is the root-bark of the *daphne mezereum*, or sponge olive, a plant figured in Plate XXIII. It is an indigenous bush, that grows to a height of four or five feet, and has bright scarlet berries. All parts of it are endowed with extreme acrimony, in virtue of which they cause irritation and inflammation in any part to which they are applied. The bark of the root is alone employed in this country. It is brown on the outside, and white and cottony internally. Applied to the skin, it blisters. Taken

internally, in small doses, it seems to have an alterative action; in larger, it acts as a powerful irritant.

Mezereum is an ingredient in the compound decoction of sarsaparilla, and is sometimes used alone in cutaneous affections. In France it is employed as a blister, the bark being for this purpose soaked in hot vinegar and water. It is also sometimes topically applied to cure the toothache.

MILK.—Milk, of which the milk of the cow is generally taken as the type, is an opaque emulsive liquid, having (it varies, however, in this respect) a specific gravity of 1030. When freshly drawn, and for some little time after, it is alkaline. If examined by a microscope, it is found to consist of a great many globules floating in a serous fluid. These globules are very minute, not being more than 1-2500th of an inch in diameter, and consist of butter. They are somewhat lighter than the liquid in which they float, and if the milk be allowed to rest, they gradually rise to the top, carrying with them a quantity of serum. This constitutes cream.

Cream has a specific gravity of about 1024. By heating it—commonly mechanically, as by the wheel of a churn put into rapid motion—the globules are united together, and then form butter.

Skimmed milk has a specific gravity of about 1034. If allowed to stand, it becomes sour, and white coagula or curds fall down in it. If we anticipate this souring by adding an acid, such as that contained in the stomach of a calf or rennet, the curd is at once thrown down, and is, when pressed and salted, called cheese.

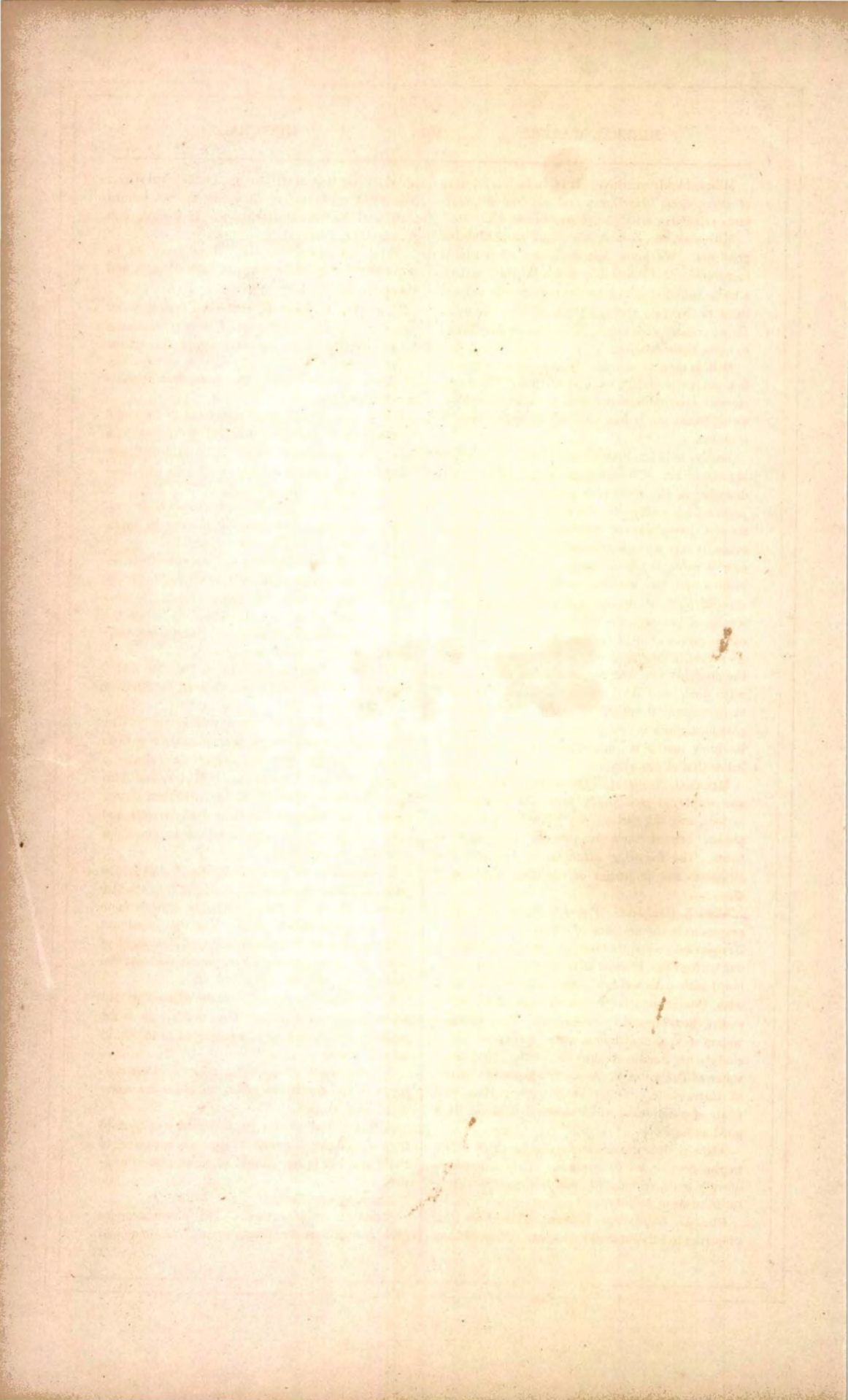
The whey, which is left after the separation of the cheese, contains sugar, salts, and water.

The following is an analysis of different kinds of milk:—

Constituents.	Cow.	Ass.	Woman.	Ewe.	Goat.
Caseum or } Cheese,.....	4.48	1.82	1.52	4.50	4.02
Butter,.....	3.13	.11	3.55	4.20	3.32
Sugar,.....	4.77	6.08	6.50	5.00	5.28
Salts,.....	.60	.34	.45	.68	.58
Water,.....	87.02	91.65	87.98	85.62	86.80
Total,.....	100.00	100.00	100.00	100.00	100.00
Solid sub- } stances, ...	12.98	8.35	13.00	14.38	13.20

There are diseased states certainly among cows, and probably in the other animals too, that cause an imperfect kind of milk to be secreted. The characteristics of healthy milk are—perfect liquidity and homogeneity, and it should contain only spherical transparent globules that are soluble in ether, and which do not thicken if ammonia be added. The proportion of cream is ascertained by a galactometer. See 'Galactometer.'





Milk is highly nutritive. It is, in fact, a mixture of albuminous, oleaginous, and saccharine proximate principles, with phosphate of lime, &c.

Milk may, too, contain other and accidental ingredients. We know that medicines administered to a nurse affect the child; and it is probable that a nurse suffering from tubercles may convey some of them to the child through the medium of the milk. Hence consumptive women should never be allowed to nurse their children.

Milk is used in chronic diseases as a nutritive, but not a stimulating article of diet. When the stomach is irritable, asses' milk is better than cows', owing to the much less quantity of butter that it contains.

Lately, milk has been employed as a manufacturing ingredient. The use to which it is thus put is described in the *Mechanic's Journal*:—"Milk now possesses other offices besides the production of butter and cheese, and the flavouring of tea. It has made its way into the textile factories, and has become a valuable adjunct in the hands of the calico printer and the woollen manufacturer. In the class of pigment-printing work, which is indeed a species of painting, the colours are laid on the face of the goods, so as to present a full brilliant face. As a vehicle for effecting this process of decoration, the insoluble albumen obtained from eggs was always used, until Mr. Pattison, of Glasgow, found a more economical substitute in milk. For this purpose buttermilk is now bought up, and the required insoluble matter is obtained from it, at a price far below that of egg albumen."

MINERAL WATERS.—These have been known and employed medicinally from the very earliest periods, and the earliest physicians, or the *Æsclepiads*, erected their temples in proximity to them. The following arrangement indicates the situation and properties of the most esteemed of them:—

Class I. Chalybeate Waters.—These owe their properties to the presence of oxide of iron. They have an inky, styptic taste, and strike a black colour with galls. In some of them, the oxide is combined with carbonic acid; and occasionally along with this is associated free carbonic acid, which causes them to sparkle or effervesce. The celebrated waters of Spa, in Belgium, are of this kind. Some chalybeates contain alkaline and earthy salts; as the water of Tunbridge Wells, Oddy's saline chalybeate at Harrowgate. Other chalybeates contain sulphate of alumina, of which the well at Moffat is a good example.

These chalybeates are analogous in their action to the ferruginous compounds. They are consequently tonic, stimulating, and astringent, and useful in cases of debility.

Class II. Sulphurous Waters.—These owe their properties to sulphuretted hydrogen. They all have

an odour like that of rotten eggs, and blacken silver. The most celebrated of these are the sulphurous springs of Moffat and Harrowgate, in Britain, and Aix-la-Chapelle, on the Continent.

These are stimulants, and are supposed to be particularly adapted for chronic skin diseases and rheumatism.

Class III. Acidulous Waters.—All spring water contains carbonic acid, but some springs possess a large quantity of it, and constitute this class. They have an acid taste, and are brisk and sparkling. If they contain an alkali, they are called acidulo-alkaline springs.

These waters would seem calculated to be useful in chronic diseases of the digestive organs; and when they contain soda, in the lithic acid diathesis. There is only one spring of this kind in Britain—that of Ilkeston, near Nottingham.

Class IV. Saline Waters.—These owe their activity to the saline ingredients that occur in them, and are arranged in five subclasses.

1. **Purging Saline Waters.**—These owe their activity either to sulphate of soda, or sulphate of magnesia. Those in which the former prevail are situated at Cheltenham and Leamington; while the wells of Scarborough, Epsom, and Sedlitz, owe their activity to the sulphate of magnesia.

All these waters are cathartic, and are frequented by those suffering from diseased liver, tendency of blood to the head, &c.

2. **Brine Waters.**—Common salt is the active ingredient in these, although some contain a little iodine or bromine. The most important of the brine springs are those of Nantwich, Droitwich, and Ashby-de-la-Zouch. They are alterative in their action, owing to the iodine, and in large doses, emetic and purgative. They are most in repute in glandular scrofulous enlargements.

3. **Calcareous Waters.**—Carbonate of lime is the principal saline ingredient in these, but they are also thermal, and their efficacy probably depends more upon their heat than the lime. The most important of them are those of Bath, Bristol, and Burton, all of which are much celebrated in chronic rheumatism, skin diseases, and hepatic affections.

4. **Alkaline Waters.**—Carbonate of soda is the active ingredient in these. That of Malvern is the most important, and may be employed in the lithic acid diathesis.

5. **Siliceous Waters.**—Some mineral waters contain a large quantity of silica, but these are never drank as medicines.

A great deal of the improvement experienced from a residence at a mineral water, is not owing to the water, but to the change of scene and relaxation.

MINT.—See 'Mentha.'

MISTURA or MIXTURE.—The pharmacopœias give instructions for preparing several compound

medicines which are called mixtures, and which are very much employed. The most important of these are as follow:—

Mixture of Acacia.—Take of

Acacia, powdered,.....Ten ounces.
Boiling water,.....One pint.

Put the acacia with the water gradually poured in, and dissolve it. This is very much employed as a basis for cough mixtures. Its dose is almost indefinite.

Mixture of Ammoniacum.—Take of

Ammoniacum,Five drachms.
Water, or pennyroyal
water,A pint.

Rub the ammoniacum with the water gradually poured on, until they are perfectly mixed. This is an expectorant in cases of chronic cough, and its dose is from one to two table-spoonfuls.

Mixture of Almonds, or Milk of Almonds.—Take of

Almond confection,.....Two ounces and
a half.
Distilled water,One pint.

Gradually add the water to the confection while rubbing, until they are mixed; then strain through linen. This is the most elegant cough mixture, or basis for a cough mixture, that the shops possess. It contains a little prussic acid. The dose is two table-spoonfuls.

Mixture of Assafœtida.—Take of

Assafœtida,.....Five drachms.
Water, or pennyroyal
water,A pint.

Triturate the assafœtida with the water until they are mixed. This is used in the hysteric affections of adults, in doses of two table-spoonfuls, and in smaller quantities in the flatulent colic of children.

Chalk Mixture.—Take of

Prepared chalk,Half an ounce.
Sugar,Three drachms.
Mixture of acacia,.....An ounce and a
half.

Cinnamon water,.....Eighteen ounces.

Mix the ingredients in a mortar. This mixture, in doses of two table-spoonfuls, is very much used in diarrhoeas. Aromatic confection and opium are very often combined with it.

Camphor Mixture, or Camphor Julep.—Take of

Camphor,Thirty grains.
Rectified spirit,.....Ten minims.
Water,A pint.

Rub the camphor with the spirit, and pour the water gradually into the mortar. This is very much employed as a vehicle for more active remedies. The dose of it is from two to four table-spoonfuls.

Compound Iron Mixture, or Griffith's Mixture.—Take of

Powdered myrrh,Two drachms.
Carbonate of potassa, ...One drachm.
Rose-water,Eighteen ounces.
Sulphate of iron,Two scruples and
a half.

Spirit of nutmeg,Two ounces.
Sugar,Two drachms.

Rub together the myrrh, the spirit of nutmeg, and the carbonate of potassa, and to these, while rubbing, add first the rose-water with the sugar, and then the sulphate of iron. Put the mixture immediately into a glass vessel, and stop it. In this mixture, double decomposition takes place, and sulphate of potassa and carbonate of iron are formed. This mixture is the best of the ferruginous preparations, and the dose of it is from two table-spoonfuls to a wine-glassful.

Mixture of Musk.—Take of

Musk,
Gum Arabic, powdered, } Of each three
Sugar, } drachms.
Rose-water,One pint.

Rub the musk with the sugar, then with the gum, and gradually add the rose-water. This mixture is used as an antispasmodic, and in cases of retrocedent gout in the stomach. Its dose is about a wine-glassful.

Scammony Mixture.—Take of

Resin of scammony,Seven grains.
Unskimmed milk,Three ounces.

Triturate the resin with a little of the milk, and gradually with the rest, until a uniform emulsion is obtained. This is an imitation of Planche's purgative potion, and "is one of the most agreeable purgative draughts that can be taken." The whole is taken for a dose.

MOLASSES, or TREACLE, is the viscid, dark-brown, uncrystallizable sirup that drains from the sugar-refining moulds. Treacle is sometimes used to make electuaries.

MOLE.—A mark on the skin, usually of a brown colour, and possessing some hairs. Moles are often congenital.

MOLLUSCA.—Invertebrated animals, with a soft not annulated skin.

MOMORDICA ELATERIUM, or SQUIRTING CUCUMBER.—This plant was known to the ancient Greeks, and used by them medicinally. It is a native of the south of Europe, but a few acres of it are cultivated at Surrey, to supply the apothecaries with elaterium. This elaterium is obtained from the fruit or cucumber, which is gathered when nearly ripe, and sliced, the juice being allowed to strain through a sieve. This juice being allowed to settle, gradually deposits the elaterium. Elaterium is a very powerful cathartic, and was formerly much employed in dropsies, and as a counter-

irritant in cerebral affections, but is now a good deal superseded by croton oil.

MONKSHOOD.—See 'Aconitum.'

MONSTER.—A monster, in medical language, is an individual in whom one or more of the organs of the body present a considerable and congenital malformation, which render him different in appearance from ordinary men. Slight degrees of monstrosity, as hare-lip, clubbed foot, &c., are not very unfrequent, but cases of greater and remarkable deviation from the natural standard are very rare. Occasionally, however, children are born who are greatly deformed, and, as has happened two or three times, twins, as the Siamese twins, are born joined together.

MOORCOCK.—The red grouse.

MOREL.—This is one of the eatable fungi. It is the *Morchella esculenta* of botanists. It springs up, during the spring and summer, in orchards and woods, and is said to grow most abundantly upon places where fires have been lit. So persuaded of this were the populace in parts of Germany, that they were in the habit of firing woods, in order to obtain crops of morels, until the custom was put down by law. The morel has an agreeable smell and taste, and, both in its fresh and dried state, is used by the cook.

MORHUA.—This is the name of a genus of fishes, two of which are of considerable consequence in a dietetical, and one in a therapeutical point of view.

1. *Morhua*, or *Common Cod*, is usually about three feet in length, and is an inhabitant of the northern seas. It abounds in all parts of the sea near the coast in this island, and its flesh, except in the spring months, when it is spawning, is very wholesome and nutritious. Within the last few years, an oil, extracted from the liver of the cod, has been so extensively employed as a remedy in consumption and other scrofulous diseases, and has been by many thought so efficacious in such cases, that it deserves here a separate notice.

Cod-Liver Oil.—For a long period the oil extracted from the livers of various kinds of fish, particularly of the cod, ling, coal-fish, perhaps the whiting, &c. &c., has been a popular remedy in rheumatism and other analogous affections. In 1782, its efficacy in chronic rheumatism was declared by Dr. Perceval; and it would appear that about the beginning of the present century it was very extensively used in the north of England, and it was noticed that those who took it were very apt to become corpulent during its use. A few years ago it was fairly introduced into regular practice, but not so much for rheumatic as for scrofulous diseases; and many are now of opinion that they have seen it cure, or render latent, tubercular consumption.

In the cod tribe of fishes, the fat, or oil, is not, as in herring and salmon, diffused through the whole

textures, but is pretty much confined to the liver. And this oil has been long extracted from the livers of these fishes, the commercial demand for it being for the currying of leather. That found in the shops of the druggist is derived from a good many sources. The liver of the common cod in this country and in Newfoundland yields a large portion, but much is likewise extracted from that of the ling and other allied fishes. In the north of Europe, on the other hand, what is called cod-liver oil is not obtained from the cod at all, but from the livers of the pollack, the coal-fish, and the dorse—particularly the last. All these fishes, are, however, nearly allied together; and it is believed that their oils are identical in composition and properties.

In Newhaven, where good cod-liver oil is made, the livers of the fish are boiled, and the oil thereby obtained filtered through a towel. In other places, however, the livers are allowed to putrefy, a process which increases the nauseous taste of the oil. Well-made oil should be light coloured, free from a putrid odour or a bitter taste. It is sometimes mixed with other oils, but the adulteration may be detected by means of sulphuric acid, which, with pure cod-liver oil, strikes a violet colour, which passes soon into a yellow or brownish red. Sometimes common train oil, in which a little iodine has been dissolved, is fraudulently sold for it.

Cod-liver oil contains both iodine and bromine, and a peculiar principle called gaduin; but the mode in which they are combined is not known. It is to these substances, in all probability, that the oil owes its therapeutical actions. It is now extensively administered in rheumatism, scrofula, and phthisis. The form of rheumatism in which it has been thought most successful, is in those chronic kinds in which the joints are nearly immoveable. The scrofulous diseases in which its good effects have been considered most remarkable, are those of the bones and in *tabes mesenterica*. It is in pulmonary consumption, however, that it has been thought to be most useful of all; and there are those who believe that, under its use, tubercular cavities in the lungs have actually cicatrized, and that now this fatal malady is not absolutely incurable.

The dose of cod-liver oil is a table-spoonful, gradually increased to four or more times this quantity, thrice a day. It has recently been stated that a little common salt, taken before and after each dose of it, will, if the stomach be irritable, make it be retained when all other devices fail.

2. *Morhua Eglifinus*, or *Haddock*.—This is smaller than the cod, but in other respects greatly resembles that fish.

MORPHIA AND ITS PREPARATIONS.—The very important alkaloid, morphia, is ordered to be prepared in the following manner by the London pharmacopoeia:—

Take of hydrochlorate of morphia, one ounce;

solution of ammonia, five drachms; distilled water, one pint. Add the hydrochlorate of morphia, first dissolved in a pint of water, to the solution of ammonia, with an ounce of water, shaking them together. What is thrown down, wash with distilled water, and dry with a gentle heat.

In this process, the ammonia unites with the hydrochloric acid, and the morphia, being set free, falls to the bottom.

Pure morphia occurs in transparent crystals, and is nearly insoluble in cold water. It has, nevertheless, a distinctly bitter taste. Boiling water dissolves about the hundredth part of its weight of it, and boiling alcohol more than twice as much as that. It is characterized by striking, with nitric acid, a deep red colour. Owing to its being so little soluble, morphia itself is not employed in medicine. Like other alkaloids it forms salts, and some of these are, perhaps, the most important preparations kept in the druggists' shops.

1. *Acetate of Morphia*.—The London form for making this is as follows:—Take of morphia, six drachms; acetic acid, three drachms; distilled water, four ounces. Mix the acid with the water, and pour them upon the morphia to saturation. Let the liquor evaporate with a gentle heat, that crystals may be formed. This salt dissolves very readily in water.

2. *Hydrochloride, or Muriate of Morphia*.—This is obtained by an elaborate process—into which it is scarcely necessary here to enter—from opium. It is colourless, inodorous, and soluble in from sixteen to twenty parts of cold water. It is the salt of morphia that is now usually prescribed.

The salts of morphia are equally useful with crude opium in relieving pain and spasm, and promoting sleep, but they do not cause constipation nor headache, and have not nearly so much tendency to produce perspiration. Hence, in all cases where it is wished to produce the anodyne, sedative, anti-spasmodic action of opium, the salts of morphia are very proper, and now generally employed. The Edinburgh College has a solution of the muriate, made of analogous strength with the tincture of opium, or laudanum.

MORTALITY.—The life of an individual is proverbially uncertain, and no man can be sure of another day's existence. But the mortality of men obeys certain fixed and regular laws, and the number of deaths that will take place among say ten thousand men, in a given time, may be confidently predicted. And it is in virtue of this that the life insurance companies are enabled to make their calculations. The plan followed is, of course, to ascertain what has taken place in a large number of individuals for a length of years. Four observations of this kind are very often referred to. These are—

1. *The Northampton Table*.—This was prepared by Dr. Price, from the burial registers of Northampton, between the years 1741-80. This, for a long

time, was the one on which the insurance companies relied, but it is now known to give the value of young and middle-aged lives at too low a rate, principally from the value of such lives having really increased since his time.

2. *The Carlisle Table*.—The basis of this was prepared by Dr. Heysham, from the Carlisle bills of mortality, from 1779-87, and it is considered the most correct account of healthy life in England. It is, therefore, much used by the insurance companies.

3. *The Equitable Table*.—This gives the experience of the Equitable Life Insurance Co., from 1760 to 1829, and agrees very closely with the deductions drawn from the Carlisle table.

4. *The Friendly Societies Table*.—This gives the history as to mortality of the labouring classes in all parts of England, from 1823-28.

The following indicates the rate of mortality as shown by the Carlisle and Friendly Societies tables:—

YEARLY RATE OF MORTALITY UPON 10,000 LIVES.

Year.	Carlisle.	Friendly Societies.*	Year.	Carlisle.	Friendly Societies.
0	1539		53	161	236
1	789		54	169	279
2	649		55	179	293
3	379		56	190	309
4	287		57	209	325
5	178		58	242	341
6	123		59	283	358
7	88		60	335	376
8	66		61	358	395
9	51		62	374	415
10	45		63	382	437
11	48		64	398	461
12	50		65	411	485
13	52	60	66	425	513
14	55	63	67	444	543
15	62	66	68	465	578
16	67	69	69	491	614
17	69	71	70	516	649
18	70	74	71	588	694
19	70	77	72	681	746
20	71	80	73	781	806
21	69	83	74	902	877
22	70	86	75	955	962
23	70	89	76	1090	1024
24	71	91	77	1074	1081
25	73	95	78	1088	1130
26	74	98	79	1184	1217
27	78	101	80	1217	1243
28	87	105	81	1338	1478
29	98	109	82	1407	1647
30	101	112	83	1509	1903
31	102	117	84	1588	2051
32	101	121	85	1753	2204
33	101	125	86	1835	2345
34	102	130	87	2162	2523
35	103	135	88	2198	2530
36	106	140	89	2155	2581
37	109	145	90	2806	2609
38	112	151	91	2858	2941
39	119	156	92	2900	3333
40	130	162	93	2593	4375
41	138	168	94	2500	5566
42	144	175	95	2333	7500
43	146	181	96	2174	10,000
44	148	187	97	2222	
45	148	194	98	2143	
46	148	200	99	1818	
47	146	207	100	2222	
48	139	215	101	2857	
49	137	223	102	4000	
50	134	233	103	6667	
51	143	243	104	10,000	
52	152	254			

* Children under 13 not included.

Thus, of ten thousand people who attain the age of 50, according to the Carlisle table, 134 die the next year; and of the same number who attain the age of 80, according to the Friendly Societies table, 1343 die the next year.

The chance of life, at ages usually considered very old, is remarkable, but is quite borne out by the experience of what we see going on around us.

MORTIFICATION.—When this unwelcome termination to an inflamed part occurs, the portion mortified loses all sensation, the blood ceases to flow through it, and it becomes cold. If it be an external part, it becomes purplish, or black vesications form upon it, and it emits an offensive odour. Mortified internal parts do not invariably assume this dark colour, and are often yellow.

Mortification is much more common in some tissues than in others. It is very seldom seen in the air-passages, not often in the substance of the lungs, and is very rare in the fibrous structures. It is not uncommon in bones, is frequent in the areolar tissue, and in the mucous membrane of the alimentary canal. Mortification sometimes depends upon the extreme severity of the inflammation, and, at others, upon a weak state of the system. Thus it comes on in violent ophthalmia, and in people labouring under fever and dropsies. Its treatment in these two classes of cases is, of course, diametrically opposite; the one requiring debilitating, the other stimulating remedies.

MORUS NIGRA, THE MULBERRY.—This fruit has been used in medicine from a very early period. Mulberries are a pleasant article of diet in febrile complaints, and an officinal sirup is prepared from them, which is principally used on account of its violet-red colour.

MOSCHUS MOSCHIFERUS, THE MUSK DEER.—This animal is about the size of a roebuck, and inhabits Asia, where it is hunted, on account of some glands that it has that contain musk. Musk is of a dark-brown colour, inclining to red, and granulated. It has a bitter and acrid taste, and the most penetrating odour of all known substances. It is occasionally used, in considerable doses, in convulsive and spasmodic diseases.

MOULDINESS.—Organic bodies, particularly in damp places, are very apt to have minute fungi grow upon them, and which, in the aggregate, are called mould. Dryness appears to be the only preventive.

MOXA.—This is the name of a remedy which, on account of the great pain which it causes, is now seldom ordered. It is a small pyramidal mass of a vegetable combustible, which is placed upon the skin, set on fire, and allowed to burn until the part to which it is applied is destroyed. The substance used in Europe to make moxas are usually made either of cotton-wool, that has been steeped in a solution of nitre, or the pith of the sunflower,

which naturally contains nitre. The combustion is kept up by means of a pair of bellows.

The application of moxas has been recommended in cases of paralysis, painful affections of nerves, and in diseased joints, and spinal maladies.

MUCILAGE.—Solution of gum.

MUCUNA PRURIENS is the tree that produces the cowhage, or cow-itch, as it is vulgarly spelt. The tree is a native of the West Indies, and produces a legume, or pod, which is covered with brown, bristly, stinging hairs. These, when applied to the skin, produce intolerable itching, and sometimes severe inflammation. Mixed with treacle, they are sometimes given internally, to destroy ascarides, but their high price is a barrier to their extensive employment.

MUCUS.—This is the name given to the fluid secreted by the mucous membranes, as those of the alimentary canal and air-passages. It is a viscid, ropy, and apparently homogeneous fluid, which mixes with water without being dissolved, and is not coagulated by heat. It is liable to be altered by disease, and, in acute inflammations of the mucous membranes, is generally supplanted by a watery and serous discharge.

The office of healthy mucus is to lubricate, and protect from the air, the mucous membrane.

MULBERRY.—See 'Morus.'

MUMMY.—This is derived from the Arabic word, *mum*, which signifies wax, and is applied to dead bodies which are, by means of wax and other materials, preserved from putrefaction.

MUMPS.—This is the name of an affection of the parotid gland. In it this organ swells, and produces considerable tumefaction beneath the ear; and, in general, the other salivary glands become more or less implicated, and it becomes very difficult to move the lower jaw. A slight degree of fever often accompanies the affection. After lasting a few days, the mumps gradually disappear. The disease is decidedly contagious, and often runs through schools, and similar establishments. The treatment consists in the application of poultices, rest, &c.

MUSA.—This is the name given to a very important genus of tropical plants that bear edible fruit. The most common of them is the *Musa sapientum*, which produces the plantain and banana, the common food of the black population of our West Indian islands, and is also abundantly employed by the natives of Asia. Three dozen fruits, it is said, will maintain a man for a week, and such, in tropical countries, appear to be more wholesome than bread. It is used both raw and cooked.

MUSCLE is an animal tissue, composed of bundles of soft fibres, usually of a red colour, and which are endowed with a peculiar power of contractility. They are divided into two classes—those of voluntary, and those of involuntary motion; the one

being under the control of the will, and the other acting independently of it, and in subjection to the laws of organic life. Muscles are abundantly supplied with bloodvessels and nerves, and constitute what is usually called the flesh.

MUSHROOM.—A great many species of fungi are eatable, but in this country, the only one, or nearly the only one, that is actually so employed, is the *Agaricus campestris* of botanists. It grows indigenously in old pastures, springing up abundantly in the months of July, August, and September, particularly after rain. They are also much cultivated in gardens. Besides being eaten, broiled, or stoved, mushrooms are extensively employed in the manufacture of catchup, or ketchup.

MUSK.—See 'Moschum.'

MUSLIN.—A thin cotton cloth.

MUSSEL.—This shell-fish, although often used as food, occasionally becomes poisonous.

MUSTARD.—This plant was employed in medicine by Hippocrates. It is indigenous to this country, and is cultivated in fields, particularly in Durham and Surrey. Two varieties of it are known, the white and the black, the latter being somewhat the more pungent of the two. The seeds are the part used; and these are sometimes employed whole, and sometimes, as is more frequently the case, ground down into flour. Mustard seeds contain a fixed oil, and a principle, *myrosine*, which, when mixed with water, forms a volatile oil; and it is to these two, probably, that mustard owes its properties.

Mustard is an acrid stimulant, and, when applied to the skin, induces vesication. Swallowed in the form of the powder, in small quantities, it appears to stimulate digestion; while, in larger, it acts as an emetic. The seeds are sometimes swallowed whole, particularly in cases of chronic rheumatism. It is the seeds of the white kind, however, that are always thus employed.

MYRISTICA OFFICINALIS.—See 'Nutmeg.'

MYROSPERMUM PERUIFERUM.—Balsam of Peru is obtained from this plant, by making incisions into its bark. It is a transparent, dark-coloured liquid, of about the consistence of treacle, and having a powerful and agreeable odour. It is stimulant, slightly tonic and expectorant, and is employed in chronic bronchial affections. It is also used externally in chronic ulcers.

MYROSPERMUM TOLUIFERUM.—Balsam of Tolu is obtained by making incisions into this plant. This is, when first brought to this country, a soft and tenacious substance, which ultimately becomes hard, and somewhat resembling, in outward appearance, common resin. It has a pleasant, sweetish taste, and an agreeable odour. Its properties are the same as those of balsam of Peru, and it is employed in analogous cases. It is also very commonly ordered as a flavouring ingredient to cough

mixtures, and also in the manufacture of fumigating pastiles.

MYRRH.—In moderate doses, this substance promotes the appetite, and creates an agreeable warmth in the stomach. Applied locally, it is a mild astringent. It is prescribed along with tonics, and is also much used as a dentifrice.

NÆVUS.—This is a congenital mark, or morbid growth, in some parts of the skin, which generally consists of a network of veins and arteries, somewhat raised above the rest of the surface of the skin. Of the cause of them, nothing is known; and the best means of getting rid of them is by exciting inflammation; and the most convenient manner of doing this is, by inoculating them with small-pox matter. In this case, a simple scar is substituted for an ugly deformity.

NAPHTHA.—This is sometimes called petroleum, or mineral oil. Two kinds of this oil are found—the one transparent, and nearly colourless, and which is naphtha proper; and a thick, darker kind, called petroleum. Both kinds appear in springs, and are probably produced by the decomposition of coal.

Naphtha is composed of carbon and hydrogen, and, as it contains no oxygen, is employed by the chemist for keeping substances, such as potassium, which have a strong tendency to become oxidated. It is a stimulating substance, and occasionally employed in chronic coughs, and also externally in skin diseases, rheumatism, and chilblains.

NARCEINE.—One of the alkaloids of opium. See 'Opium.'

NARCISSUS.—None of the narcissus genus are now used in medicine in this country. They are, however, employed in spasmodic diseases, &c.

NARCOTICS.—Properly speaking, a narcotic is a drug which occasions sleep, and, if in sufficient quantity, coma. The most important of these is opium, and next, perhaps, henbane and lactarium. In small doses, narcotics cause excitement; in larger ones, they diminish the contractility of the muscular fibre, and induce sleep, or stupor. When this stupor becomes considerable, the state is called narcotium. In it the pupils are usually contracted.

Narcotics are employed, at least opium is, in small doses, as a stimulant; and in larger doses, to relieve pain (from which circumstance they are called anodynes and paragogics); to diminish the violence of muscular contractions (hence named antispasmodics); and to produce sleep (and therefore called hypnotics and soporifics).

NARCOTINA.—One of the alkaloids of opium. See 'Opium.'

NATRON.—Sesquicarbonate of soda.

NAUSEA.—This uneasy sensation is sometimes valuable as a symptom. In some cases, it is an indication of irritability of the stomach; but, in others, it is produced by morbid states of distant organs, particularly the kidney and brain.

NEROLI, OIL OF.—This is obtained by submitting orange flowers, along with water, to distillation. It has a very aromatic and fragrant odour, upon which account it is used both in medicine and perfumery.

NERVE and NERVOUS SYSTEM.—The nervous system in man and the higher animals, consists of a brain, spinal marrow, and nerves. Besides these, there are ganglia. Two structures enter into the composition of nervous matter; one a white fibrous one, and the other a grey and cellular substance.

The arrangement of the nervous system in man is shown in the Frontispiece, Plate XII., and in figures 19 and 20, Plate VI.

NETTLE-RASH.—The eruption of nettle-rash occurs in wheals, or irregular eminences, of a red and white colour, very similar to those produced by the stings of nettles. It is accompanied by great heat and itching. There are two forms of nettle-rash—the acute and the chronic. In the acute there is fever, and it is almost always caused by some article of food which has disagreed with the stomach; and of all articles of food, shell-fish, perhaps, most frequently produce this effect; and mussels, probably, the most frequently of shell-fish. Other substances, however, in particular individuals, induce nettle-rash. An hour or two after any of these have been swallowed, a state of feverishness comes on; there is nausea and headache, the skin burns, and in a little the rash makes its appearance. The best treatment consists in giving an emetic.

The chronic form of nettle-rash is a very obstinate disease, and seems to depend on some peculiar disorder of the digestive organs. The rash comes and goes without any assignable cause, and produces a great deal of discomfort. The most successful treatment consists in giving antacid purgatives and bitter tonics.

NEURALGIA.—This is a painful, but not an inflammatory affection of a nerve. Various nerves are thus affected. When those of the fifth pair in the face are implicated, the disease is often named tic douloureux; when the sciatic nerves, sciatica; when those of the stomach, gastrodynia; and angina pectoris is probably another form of it.

The pain in neuralgia is always very intense, and a severe attack of it, perhaps, produces the greatest suffering that ever happens in the human frame. Sometimes the pain distinctly intermits, and is present at a certain time every day, or every other day, only. At other times it is pretty continuous, but in such cases it always has exacerbations.

Neuralgia occurs most frequently in people suffering from a broken and debilitated constitution, and the digestive organs are almost always in a disordered state. It is also produced by exposure to cold and damp, and it would also seem to be affected by the exciting cause of ague or malaria.

Whenever the pain, in a neuralgic affection, very

decidedly intermits, cinchona bark, or quinine, should be given; and if it fail, arsenious acid. In cases where the pain is continuous, or when it comes on at irregular intervals, preparations of iron have often an almost magical effect, because, probably, they cure the cachectic state of the system, upon which the disease depends. When it comes on after exposure to cold, and is allied to rheumatism, we may expect relief to follow the exhibition of colchicum. And in all cases we should endeavour to restore the tone of the digestive organs.

Some local applications give, at least, temporary relief in neuralgic affections. Of these the most valuable would seem to be the aconitina.

NEUTRAL SALTS.—This expression was formerly applied to such salts as contained an excess of neither alkali nor acid; but the term, neutral salt, now includes those compounds which contain one equivalent of each of their constituents.

NICKEL.—This metallic element has considerable lustre, is easily worked, and not acted upon by the air or moisture at ordinary temperatures. Hence an alloy of it is now much used as a substitute for silver, and called German silver. There are now a great many varieties of German silver sold, some of which contain no nickel.

NICOTIANA TABACUM, or TOBACCO.—The tobacco plant has been cultivated from time immemorial in Oronooka. The plant, however, does not appear to have been known to Europeans until the discovery of America, although the practice of smoking vegetables in pipes is of much earlier date. Seeds of the plant were sent to France, in 1560, by Jean Nicot. It was introduced into England by Sir Francis Drake, and smoking, or “taking” tobacco, as it was called, soon became fashionable, one of the earliest patrons of it being Sir Walter Raleigh.

The etymology of the word tobacco is doubtful. One explanation of it derives it from tabac, an American name for a pipe.

Nicotianum tabacum is now very extensively cultivated both in America and Europe, but its growth is prohibited in Great Britain and Ireland.

Tobacco leaves, as met with in commerce, have a dark colour, a strong and peculiar odour, and a bitter taste. They are variously prepared for the market. When merely moistened and compressed, they constitute cavendish, negro-head, and pigtail; and when cut into shreds, shag, returns, &c. Snuff is prepared by allowing the tobacco leaves to undergo a species of fermentation, during which ammonia is evolved.

Tobacco contains a peculiar alkaloid, called nicotiana, to which its peculiar properties are owing. Swallowed in small quantities, tobacco produces a feeling of nausea and giddiness; and in somewhat larger, vomiting, tremor, and loss of power in the muscles; and if the dose be greater still, these are followed by stupor and death.

The effect of snuff, unless some escape down the gullet, is mainly topical. The inhalation of the smoke, in those not accustomed to it, has similar effects to those just described as happening when it is swallowed.

Owing to its power of depressing the muscular system, tobacco has proved very useful in cases of tetanus, &c.

NITRATES.—Salts of nitric acid.

NITRE, or SALTPETRE.—This is the nitrate of potassa. In many parts of the East it occurs as a natural product, and is artificially formed, in many parts of Europe, by burning animal matter, and allowing it to putrefy. Part of its nitrogen unites with oxygen, and forms nitric acid, which combines with the potassa that was contained in the animal tissues.

When pure, saltpetre is colourless and transparent, and has a sharp, cooling taste. When heated, it fuses, and may be cast into moulds, in which state it constitutes the sal-prunelle of the shops. Nitre dissolves in water, and during the solution there is a good deal of cold generated.

In very large doses, nitre acts as a narcotico-irritant. In moderate doses, it is a refrigerant, diuretic, and diaphoretic. It is used in febrile affections as such, and it makes a very good addition to mixtures in dropsies.

Saltpetre possesses antiseptic properties, and is much used in the preservation of meat.

NITRE, SWEET SPIRIT OF.—This is the common name for spirit of nitric ether, prepared by mixing nitric acid and spirit together. It is a colourless, limpid liquid, having a fragrant, ethereal odour, somewhat resembling that of ripe apples, and a pungent, aromatic taste. It is very volatile, and produces much cold during its evaporation.

Spent spirit of nitre is a refrigerant and diuretic, a good deal employed in fevers and dropsies. It is also used locally to produce cold.

NITRIC ACID.—This is popularly termed aqua-fortis. It is prepared by decomposing saltpetre by sulphuric acid. It always has water combined with it. Strong liquid nitric acid is colourless, has a remarkable odour, and an acrid and very sour taste. Exposed to the air, it evolves white fumes, formed by the union of the water of the atmosphere and it; and when mixed with water, heat is evolved.

Strong nitric acid acts as a very powerful caustic, immediately destroying any animal tissue to which it may be applied. If swallowed, of course it produces mortal inflammation and disorganization of the stomach. It is remarkable for the yellow stain that it produces upon the skin. Properly diluted, it is a tonic and refrigerant, and is considered particularly useful in chronic hepatic affections. It is also applied externally, in its strong state, as a caustic to destroy warts. Diluted, it has also been recommended as an application to languid and ill-

conditioned sores, and to skin diseases. In these latter affections it is also used, mixed with lard, as an ointment.

NITRO-MURIATIC ACID.—This is prepared by mixing nitric and hydrochloric acids together. It is the aqua-regia of the alchemists, and is a solvent of gold. Diluted, it has been used internally in chronic hepatic diseases, but it is now very little employed in medicine.

NOCTAMBULISM.—See 'Somnambulism.'

NOSOLOGY.—This is the classification of diseases into classes, genera, and orders. That of Cullen is the most perfect of all artificial ones, and the following is an abstract of it:—

Class I.—Febrile diseases, characterised by a quickened pulse, an increased heat, some of the functions disturbed, and the muscular strength, in particular, diminished.

Order 1. The fevers proper.

" 2. The inflammations.

" 3. The exanthematous fevers.

" 4. The hæmorrhages.

" 5. The fluxes.

Class II.—The nervous diseases, characterised by an injury of sense and motion, without idiopathic fever and local disease.

Order 1. Comatose diseases; *i. e.*, diseases, of which the main symptoms are loss of sensation or motion, with stupor.

Order 2. Adanynic diseases, *i. e.*, diseases, of which the main symptoms are diminished involuntary motions.

Order 3. Spasmodic diseases.

Order 4. Mental diseases.

Class III. Cachectic diseases, characterised by a depraved habit of the whole or a part of the body.

Order 1. Emaciation of the whole body.

Order 2. Swellings of the whole or part of the body.

Order 3. Diseases affecting the skin.

Class IV. Local diseases, characterised by affecting a part of the body.

Order 1. Depraved or lost senses.

" 2. Erroneous or deficient appetites.

" 3. Hindered or depraved motions.

" 4. Fluxes, without febrile symptoms.

" 5. Suppression of excretions.

" 6. Local tumours, without fever.

" 7. Tumours of parts out of their own place.

" 8. Solutions of continuity.

NUTMEG.—See 'Myristica.'

NUX VOMICA, or the POISON NUT, is the seed of the *Strychnos nux Vomica*. This tree was known to the Arabian physicians. It is of a middle size, and a native of Coromandel and other parts of India. The seeds are round, about an inch in diameter, nearly flat, and, from a fancied resemblance to the eyes of crows, are sometimes known in commerce by the name of *crows' eyes*. These seeds

contain a peculiar alkaloid, called *strychnia*, and also another, called *brucia*. See 'Strychnia.'

The effect of *nux vomica* upon man is very remarkable. In extremely small doses, it acts as a tonic. In somewhat larger, it manifests itself by a disordered state of the muscular system. The precursory symptoms are a feeling of weight and weakness of the limbs, and increased sensibility to the external impressions, with depression of spirits. Then, if the administration of the drug be continued, the patient experiences a difficulty of keeping the erect posture, and in walking frequently staggers. "If," says Pareira, "when this effect is beginning to be observed, he be tapped suddenly on the ham when standing, a slight convulsive paroxysm is frequently brought on, so that he will have some difficulty to prevent himself from falling. I have often in this way been able to recognize the effects of *nux vomica* on the muscular system, before the patient had experienced any particular symptoms.

If the *nux vomica* be persevered with, these effects increase in intensity, and by very slight causes the voluntary muscles are thrown into a convulsed state. Thus, this state of convulsion is brought on even by turning in bed. If the drug be still continued, the paroxysms come on without any exciting cause, and when the person so drugged is laid still in bed. If the medicine be still continued, or if a large dose be at once administered, the most violent convulsive movements of the voluntary muscles are induced, which render breathing impossible, and therefore cause death, in the way of asphyxia.

These properties clearly indicate the use of the *nux vomica* in chronic paralysis, and in such cases it is often of great use.

NYCTALOPIA, or NIGHT BLINDNESS, is a common disease among seamen in the East Indies, and other hot countries. To persons affected by it, all objects appear, at sunset, as if covered with an ash colour, which gradually becomes darker, and then surrounds them with complete darkness. The cause is probably an exhausted state of the retina, produced by the long exposure to great glare, either direct from the sun, or reflected from the clear water. In fact, nyctalopia is analogous to the loss of vision, experienced for a moment or two by all, when they go from a brilliantly-lighted place into a comparatively dark one.

OAK.—The oak, the *Quercus* of botanists, was held sacred by the Greeks and Romans, and also by our British ancestors. It is a large and handsome tree, and is very remarkable for its longevity, and individual oaks have been known to live upwards of a thousand years. It is indigenous, and also a native of most parts of Europe. The official part is the bark, which contains a large quantity of tannic acid, and is used as an astringent. It is also very extensively employed by the tanner.

This bark is more easily separated from the wood

in the spring, and is accordingly cut at that season. The gatherers, or barkers, as they are called, make a longitudinal incision with a mallet, furnished with a sharp edge, and a circular one, by means of a bill. The pieces are afterwards carefully dried in the air. It generally contains about thirty per cent. of tannin. It is used as a topical and general astringent. Reduced to a state of fine powder, it is one of the substances that has been inhaled into the lungs in cases of consumption. It has long been a popular opinion, that working tanners are exempt from this fatal disease; and Dr. Dods, who investigated this point, came to the conclusion that there was some foundation for this belief, and that the exemption was owing "to the inhalation of the peculiar aroma, or volatile matter, which is constantly arising from tan-pits during the process of tanning with bark."

Oak bark also possesses an anti-periodic property, and may be given in intermittents.

Another species of oak, the *Quercus suber*, or cork oak, may here be mentioned. The cortical portion of this tree constitutes that very useful substance, cork. Owing to its great elasticity, it forms the most useful substance we possess for stopping bottles. It was also formerly used in medicine, and, when reduced to powder, was employed as a styptic. Hung about the neck of nurses, it was long held to have the power of stopping the secretion of milk.

OAT.—This is the grain of the *Avena sativa*. It is the most nutritious of all grains, and as a larger produce, per acre, can be obtained of it than of any other cereal, it is the most economical. A very weak infusion of its meal constitutes gruel, one of the standard dishes of the sick-room. Gruel is also employed as a demulcent, in cases of poisoning by acrid substances.

OCIMUM.—This is the basil, which is still occasionally used, in domestic medicine, as an aromatic carminative.

OIL.—There are two kinds of oils: the one of which is named volatile, because it is entirely dissipated on the application of moderate heat; while the other is named fixed, from its not being so affected. Both kinds are composed of carbon, hydrogen, and oxygen, and a great many of them are of great importance as dietetical agents, or as drugs.

In this country, the oil of milk, or butter, is the favourite oleaginous article of food; but, on the Continent, large quantities of olive and poppy oils are consumed in cookery.

Volatile oil is found in both the inorganic and the organic kingdoms of nature, but is most common among vegetables. Naphtha is an example of a mineral volatile oil; castor as one occurring in the animal kingdom; while cinnamon, horse-radish, and a great many others, are derived from plants.

All these are usually obtained by distillation. Volatile oils may be, at ordinary temperatures, either fluid or solid; and in the latter case, they are crystalline. In general they consist of two oils, the one much more fluid than the other. The solid one is sometimes separated, as is the case with camphor, which is the solid part of the volatile oil of the *Camphora officinarum*. All volatile oils have a strong odour, and a warm acrid taste. They are very slightly soluble in water, the saturated solutions of them in that fluid forming the distilled waters of the pharmacopœia. When exposed to the air, they are apt to become oxidated, and converted into resins.

The fixed oils consist of a liquid and solid oil, called margarine and elaine, and the consistence of any particular oil depends upon which of the two predominates.

OINTMENT.—An ointment is an unctuous preparation for external use. The pharmacopœia gives directions for preparing a great many. The composition of the most important of these, with their uses, is as follows:—

Acetate of Lead Ointment.—Take of

Acetate of lead,.....Two drachms.
White wax,.....Two ounces.
Olive oil,.....Eight ounces.

Mix. This is an excellent application to irritable sores, blisters, &c.

Tartar Emetic Ointment.—Take of

Tartar emetic, in very fine }
powder,..... } One ounce.
Lard,.....Four ounces.

Mix. A portion of this ointment, about the size of a nut, is to be rubbed into the skin, night and morning. After it has been so used three or four times, a crop of pustules come out. In this manner, a very considerable amount of counter-irritation may be produced.

Black Basilicon Ointment.—Take of

Black pitch, wax, and resin, }
of each } Nine ounces.
Olive oil,.....Sixteen ounces.

Melt them together, and press through a linen cloth. This is used in ringworm and scabbed head.

Belladonna Ointment.—There is no official preparation of this, but it may be made by mixing a drachm of extract of belladonna with an ounce of lard or spermaceti ointment. It is an anodyne ointment.

Calamine Ointment.—Take of

Calamine and wax, of each,.....Half a pound.
Olive oil,.....Sixteen ounces.

Add the calamine to the melted wax and oil, when they begin to thicken. This is often applied to burns, superficial ulcerations, and the like.

Cantharides Ointment.—Take of

Cantharides, in very fine powder,...One ounce.
Distilled water,.....Four ounces.
Resinous cerate,.....Four ounces.

Boil the water with the cantharides down to one half, and strain. Mix the cerate with the strained liquor, and then evaporate the mixture to a proper consistence. This is used for dressing a perpetual blister, and for issues.

Citrine or Golden Ointment.—Take of

Mercury,.....One ounce.
Nitric acid,.....Eleven drachms.
Lard,.....Six ounces.
Olive oil,.....Four ounces.

Dissolve the mercury in nitric acid, and mix, while hot, with the lard and oil melted together. This is a stimulating ointment, and is used, in skin diseases, to dress languid sores, and, diluted with its own weight of almond oil, to the eyelids, in chronic ophthalmia.

Elenic Ointment.—Take of

Elenic,*One pound.
Common turpentine,.....Ten ounces.
Suet,.....Two pounds.
Olive oil,.....Two ounces.

Melt the elenic and suet, and, having removed the mixture from the fire, add the turpentine and oil, and then strain through linen. This is an issue ointment.

Blue or Mercurial Ointment.—This is prepared by rubbing mercury and lard together, until the metallic globules can no longer be distinguished. It is used as a dressing for sores, and also when it is wished to obtain the constitutional effects of mercury. It is also employed for destroying parasites upon the skin.

When it is wished to excite very speedy salivation, half a drachm of it may be rubbed into the skin every hour. If, however, it is not wished to produce the effect so speedily, half a drachm may be rubbed in night and morning.

On the Continent, this preparation is given internally, and would seem to be the most active of this class of mercurial compounds.

Compound Iodine Ointment.—Take of

Iodine,.....Half a drachm.
Iodide of potassium,.....A drachm.
Rectified spirit,.....A drachm.
Lard,.....Two ounces.

Rub the iodine with the iodide and the spirit, and then mix with the lard. This is rubbed into the skin over enlarged glands, &c.

Tar Ointment.—Take of

Tar,..... }
Mutton suet, }Of each a pound.

* "Elenic," says the *Edinburgh Pharmacopœia*, "is the concrete resinous exudation from one or more unascertained plants."

Melt them together, and press through a linen cloth. This is often applied to ringworms, "in which," says Pereira, "it sometimes succeeds, but more frequently fails to cure."

Pepper Ointment.—Take of

Powdered black pepper,.....Four ounces.

Hogs' lard,A pound.

Mix. This is sometimes used in cases of scabbed head.

Resin or Basilicon Ointment.—Take of

Resin, }Of each one pound.
Wax, }

Olive oil,.....Sixteen ounces.

Melt the resin and the wax together with a slow fire, then add the oil, and press through a linen cloth. This is very much used as a mildly stimulating ointment.

Savine Ointment.—Take of

Savine, bruised,.....One pound.

Wax,.....Half a pound.

Lard,.....Two pounds.

Mix the savine in the lard and wax melted together, and strain through a linen cloth. This is used as a dressing for a perpetual blister.

Elder Flower Ointment.—Take of

Elder flowers, }Of each two pounds.

Lard, }

Beat the flowers in the lard until they become crisp, then press through a linen cloth. Owing to its perfume, it is an agreeable dressing for blisters, &c.

Sulphur Ointment.—Take of

Sulphur,.....Three ounces.

Oil of bergamot,.....Twenty drops.

Lard,.....Half a pound.

Mix. This is well rubbed in, night and morning, for a few days, in cases of itch. There is also a compound sulphur ointment, which also contains hellebore.

Hellebore Ointment.—Take of

White hellebore, powdered,.....Two ounces.

Oil of lemons,.....Twenty drops.

Lard,.....Eight ounces.

Mix. This is also, although seldom, used in the treatment of itch.

OLD AGE.—Sometimes there are but slight modifications of structure in the old. Most commonly, however, they are very striking. Even the chemical properties are altered. The gelatine is converted into albumen, or disappears; the quantity of fibrine is increased, is of a deeper shade, and is not so readily affected by exposure to the air. Then there is an increased quantity of phosphate of lime, and, indeed, of all the earthy salts and the urea.

The various tissues, &c., are a good deal affected and altered. Fat generally diminishes, and is often less firm, and of a deeper colour; the cellular tissue

is much less elastic than in youth or middle age; the fibrous structures are more rigid, and increased in quantity, and often the seat of calcareous deposits. The same is true of the serous membranes, while the mucous ones are paler.

The muscles are diminished in bulk, much more rigid, and less under the control of the will; they are paler, their tendons and aponeuroses are less elastic, and often ossified, and the portion of muscle near them is often converted into tendon.

The integuments, particularly those of the face, appear much changed, and really are so to a considerable extent. The skin is thicker and firmer, and, from the cellular tissue and other soft parts being diminished, it is wrinkled.

The bloodvessels are greatly altered. The arteries are diminished, their coats become much denser, their calibre lessened, and some of the smaller ones completely obliterated. The veins, on the contrary, are enlarged, their coats are thinner, and their capacity in every way increased. In advanced life they contain more than two-thirds of the blood of the whole body. The arteries, also, are particularly liable to ossific deposits.

The bones are both denser and enlarged, and contain a more than usual quantity of earthy salts. The sutures, too, become more attached to one another. The cartilages are sometimes, as is very often the case with those of the ribs, ossified, and sometimes, as in the vertebral, partially absorbed and very inelastic.

The membranes of the brain are thicker and more opaque, and the substance of that organ is denser, firmer, and shrunk. The nerves have less medullary matter, and the ganglia are firmer, smaller, and of a deeper colour.

The cornea of the eye is less prominent, the crystalline lens is somewhat shrunk and more coloured, and all the nerves of the eye are less acute. The fluid of the internal ear is lessened in quantity, and the auditory nerve is less sensible to its own peculiar sensations.

Then, as to the various viscera, &c.,—the teeth decay, the gums are absorbed, and thus the jaws approximate; the muscular coat of the stomach and intestines is less contractile, and has a flaccid appearance. The lungs are less elastic, generally somewhat emphysematous, and having some of the smaller bronchi dilated. The heart is less coloured, softer, and less elastic; often, too, it is less, or its parietes thinner, and cartilaginous formations are common to all its internal surface. There is a strong tendency to the deposition of calculi in the bladder.

Then there are the well-known changes that take place in the hair,—the substitution of grey or white for the previous colour, or the death of the bulbous roots, which produce the loss of the hair altogether.

OLIBANUM.—This substance was the frankincense used by the ancients in their religious ceremonies. It was called by the Hebrews, *lebanah*. It is the gum-resin of a tree growing in the mountainous parts of the Coromandel. Formerly, it was much employed to restrain inordinate discharges from the mucous surfaces, but is now hardly ever prescribed.

OLIVE TREE.—This is the *Olea Europæa* of botanists. It has been known from the earliest ages, and has always been adopted as the emblem of benignity and peace. It is a long-lived tree, of slow growth. It is an inhabitant of the Levant, Barbary, and the south of Europe, where it is extensively cultivated, and where, from the whitish character of the foliage, it gives a dull and monotonous appearance to the country. The object, at least the principal object, of its culture, is for the sake of its fruit. These, in an unripe state, are preserved in salt and water, and used at desserts and in cookery; but it is the oil of the ripe olive that is of by far the greatest importance.

About 100 pounds of ripe olives yield thirty or more pounds of oil. This olive, or *sweet oil*, as it is sometimes called, is a fluid of a pale greenish yellow, without smell, and of a mild taste. When exposed to a temperature of 32°, it deposits its margarine.

Several varieties of it are to be met with in the market. That called Provence oil, and the produce of Aix, is in most esteem. Florence oil is another very fine kind, that is sent to this country in very thin glass flasks, and is generally known by the name of salad oil. Gallipoli oil is an inferior sort, that comes from Naples, and forms the largest portion of the oil sent to this country.

Olive oil is remarkably nutritious, but is not much used dietetically in this country. Taken in large doses, it is a demulcent and laxative, but is rarely employed as such. It is very extensively employed in pharmacy in making ointments, cerates, and plasters.

OMENTUM.—This is a broad band of membrane, that connects the abdominal viscera together. The most important of these membranes is the one that connects the colon with the stomach. It is this that is the great seat of fat in corpulent persons, and which contributes to the projection of the abdomen in such people.

ONION.—This plant has been known and used from the very earliest times. It was employed medicinally by Hippocrates. It is remarkable for the length of time during which its bulb can maintain its vitality, and one found in the hand of an Egyptian mummy has been known to grow, although it was probably two thousand years old. Its taste is sweet and acrid, and, when cut, it evolves an acrid principle, which causes a flow of tears.

This is owing, probably, to its volatile oil. Onions, too, are rather remarkable for the large quantity of sulphur which they contain.

Onions are very extensively used as a dietetic, and in cookery. They are occasionally taken as an expectorant, and particularly in the case of old people, it is said, with benefit. A roasted onion is a domestic application in cases of earache.

OPHTHALMIA.—This is the general name for the inflammation of all or any portion of the eye.

OPIUM.—This is the concrete juice of the unripe capsule of the white poppy, and is, perhaps, the most important drug that we possess.

The poppy is one of the most anciently known and cultivated plants. Homer speaks of it as growing in gardens, and ever since the time of Hippocrates, opium has been used in medicine. The word is derived from *οπος*, juice, and signifies that it is the juice *par excellence*. The white poppy is an annual herb, that grows to from two to six feet high, produces smooth globular capsules, which, when ripe, contain a number of seeds that abound in a bland oil. It is very extensively cultivated, in a great many countries, for the sake of its capsules, opium, and this oil.

The capsules, or poppy-heads, as they are commonly called, are generally collected when quite ripe, but they are more efficacious when plucked in an immature state. They vary in size, from the bigness of a hen's egg to that of the fist. They contain opium, and, as will be seen by-and-by, three official preparations are made from them.

Opium is obtained by making incisions into the half ripe poppy capsules, and then collecting the exuded juice. There are several commercial varieties of it. The appearance of the Smyrna, the most esteemed, is as follows:—It occurs in flattened or irregular rounded masses, which rarely exceed two pounds in weight, and are enveloped in leaves. When they are first imported, they are soft, and have a reddish colour, but by keeping they become hard and black. The lustre of this opium is waxy, its odour strong and disagreeable, and the taste bitter, acrid, and nauseous.

The following is Mulder's analysis of a sample of Smyrna opium:—

Morphia.....	10.842
Narcotina.....	6.808
Codeia.....	.678
Narceine.....	6.662
Meconic acid.....	5.124
Fat.....	2.166
Caoutchouc.....	6.012
Resin.....	3.582
Gummy extractive.....	25.200
Gum.....	1.042
Mucus.....	19.086
Water.....	9.846
Loss.....	2.148

100.000

Some of these constituents of opium are of very great importance. Morphia is so named from Morpheus, the god of sleep. It exists in the opium, in combination with meconic acid. It readily combines with inorganic acids, and some of such salts are used in medicine, as will be noticed at the end of this article. Narcotina is rather improperly so called, for it does not appear to possess much if any activity as a soporific. Codeia is named from the Greek word that signifies poppy-head, and seems to possess some narcotic property. Narceine is so called from *νάρκη*, stupor; but in reality it is inert. Meconic acid likewise is without action upon the economy.

The therapeutical value of opium clearly depends upon the proportion of morphia which it contains. Still the action of some of the other peculiar substances that it contains is not yet properly understood.

When a dose of opium, say from a quarter of a grain to a grain, is taken, it first acts as a stimulant. The mind is usually exhilarated, the ideas flow more quickly, and a general feeling of happiness and comfort is induced. After a time, particularly if the person who has taken it be alone and in the dark, there is the feeling of desire to repose, which is soon followed by deep sleep. If to a person in solitude and the dark, a larger dose, as from two to four grains, are given, there is very soon inability to exertion, torpor, and sleep induced. In both these instances, the person, when he awakes, suffers from headache and disorder of the stomach.

If a still larger or poisonous dose be given, other symptoms are witnessed. "The symptoms of poisoning with opium"—says Dr. Christison—"when it is administered at once in a dangerous dose, begin with giddiness and stupor, generally without any previous stimulus. The stupor rapidly increasing, the person becomes motionless and insensible to external impressions; he breathes very slowly, generally lies quite still with the eyes shut and the pupils contracted, and the whole expression of the countenance is that of deep and perfect repose. As the poisoning advances, the features become ghastly, the pulse feeble and imperceptible, the muscles exceedingly relaxed, and, unless assistance is speedily procured, death ensues. If the person recovers, the sopor is succeeded by prolonged sleep, which commonly ends in twenty-four or thirty-six hours, and is followed by nausea, vomiting, giddiness, and loathing of food."

The practice of habitually taking opium, or opium-eating, as it is called, has long been practised in the East, and is now naturalized in this country. Occasionally, very large quantities are thus consumed, and the practice does not appear to be decidedly injurious. In China, and the islands of the Indian Archipelago, as is well known, it is a very common custom to smoke opium, and, as far as is known, no evil result is the consequence.

But, besides its action upon the nervous system, opium has a very decided effect over the excretions, diminishing all of them, save the perspiration, which it considerably augments.

The following is an abstract of the uses to which opium is put in the treatment of disease. In fever it is ordered when there is great watchfulness, delirium, tremor, or diarrhoea; in inflammatory diseases, conjoined with blood-letting, it is the sheet-anchor of the practitioner. In delirium tremens its efficacy is universally admitted. Few cases of diseases of the respiratory organs can be satisfactorily treated without the aid of opium; and in all cases attended with pain, it is the palliative that is almost always to be relied upon. In hemorrhages, too, in which there is great irritability, along with a small pulse, it is invaluable.

The most important of the official preparations of opium and of poppy-heads are the following:—

Sirup of Poppies.—Take of

Poppy-heads,.....	Three pounds.
Sugar,.....	Five pounds.
Boiling water,.....	Five gallons.

Boil down the capsules in the water to two gallons, and strongly express the liquor while hot. Boil down the strained liquor to four pints, add the sugar and dissolve it. This is very much employed as a child's opiate, to mitigate pain, allay spasm, and induce sleep. A very common and a dangerous imitation of it, is made by mixing laudanum and treacle.

Extract of Poppies.—Take of

Poppy-heads (without the seeds),.....	Fifteen ounces.
Boiling water,.....	One gallon.

Macerate for twenty-four hours, then boil down to four pints, and filter the liquid while hot. Lastly, boil down to a proper consistence. This is a sedative and anodyne, and thought less liable to induce headache than opium.

Opium Pills.—Take of

Opium,.....	Twenty-four grains.
Sulphate of potassa,....	Seventy-two grains.
Conserve of roses,.....	Twenty-four grains.

Beat into a mass, and divide into twenty four pills.

Confection of Opium.—Take of

Powdered opium,.....	Six drachms.
Long pepper,.....	One ounce.
Ginger,.....	Two ounces.
Caraway,.....	Three ounces.
Tragacanth,.....	Two drachms.
Sirup,.....	Sixteen ounces.

Rub the opium with the sirup, previously heated; then add the other ingredients, and add the sirup when it is required for use. This is aromatic and narcotic, and much employed in cases of colic and diarrhoea.

Tincture of Opium or Laudanum.—Take of
Hard opium, powdered.....Three ounces.

Proof spirit,.....Two pints.

Macerate for fourteen days, and filter. Nineteen minims of this, the most abundantly used of all the preparations of opium, contain one grain of opium. Notwithstanding that laudanum is always sold at a price which leaves a large profit, it is often very much adulterated and diluted.

Opium Wine.—Take of

Opium,One ounce.

Cinnamon, bruised, }
Cloves, bruised, } One drachm of each.

Sherry wine,Two pints.

Macerate for fourteen days, and filter. This is sometimes called Sydenham's liquid laudanum. Its effects are similar to those of laudanum, while its taste and smell are more agreeable. Its principal employment is as a local application to the eye in ophthalmia. Whenever there is much scalding pain, flow of tears, and intolerance of light, it is very efficacious. It first causes pain, and an increased flow of tears, but these effects soon pass away, and are followed by great abatement of the former sufferings.

Ammoniated Tincture of Opium, or Scotch Paregoric.—Take of

Benzoic acid, }
Saffron, chopped, } Three drachms each.

Opium, sliced,.....Two drachms.

Oil of anise,.....Half a drachm.

Spirit of ammonia,One pint.

Digest for seven days, and filter. In chronic bronchitis, asthma, &c., this is perhaps the best preparation of opium. Each drachm and a quarter contains one grain.

Vinegar of Opium.—Take of

Opium,.....Four ounces.

Distilled vinegar,.....Sixteen ounces.

Macerate for seven days. This is an imitation of a celebrated quack medicine, called Black Drop, or Quaker's Black Drop. This, however, was a solution of opium in the juice of the wild crab-apple. It is believed to have less tendency to produce headaches than laudanum.

Muriate of Morphia.—The most important of the salts of morphia is the muriate, which is prepared by decomposing the muriate of morphia contained in a solution of opium, by means of muriate of lime. While muriate of morphia produces all the anodyne and narcotic effects of opium, its use is not followed by nearly so much headache and disorder of the digestive functions. Hence it is now very extensively used. The Edinburgh College has a solution of muriate of morphia, of analogous strength to laudanum.

It is important to know that the action of all the preparations of opium upon young children is very energetic, and, therefore, they require to be admin-

istered to this class of patients with extreme caution.

OPODELDOC.—Tincture of soap and opium.

OPOPONAX.—This is a gum-resin obtained by making incisions into the root of the *Opoponax chironium*, a plant that is cultivated in the south of Europe. The gum-resin possesses characters analogous to those of *asafetida*, but is very seldom at the present day employed.

ORANGES.—The tree that produces the orange has before been noticed—(see '*Citrus*.) The sweet orange is very largely consumed in this country, more, however, as a dessert than an article of food. It is useful, too, in febrile affections, allaying thirst and reducing the heat.

The leaves of oranges are feebly bitter, and contain a volatile oil, which is sold in the shops under the name of *essence de petit grain*. Orange flowers, too, yield a very fragrant volatile oil, known as oil of Neroli, and is one of the constituents of *Eau de Cologne*. During the great heats of summer, the small, green, immature fruits fall off in great numbers, and are carefully collected. These are the orange berries of the shops, and are employed in flavouring curaçao, and also for making issue peas, a purpose for which, from their pleasant smell, they are well qualified. The rind, also, yields a volatile oil.

The bitter orange, in all these respects, is very similar to the sweet kind.

ORANGE-FLOWER WATER.—This is obtained by distilling the flowers, and is very extensively used abroad as a *placebo*, and as the basis for more efficacious remedies.

ORCHIS.—See '*Salep*.'

ORIGANUM VULGARIS.—The botanical name of the marjoram.

ORNUS EUROPEA, or the flowering ash.—This is a small tree that grows in the south of Europe, particularly in Calabria and Sicily. Incisions are made into it, and an exudation that takes place from them carefully collected. This exudation is called manna. It is brought to this country in irregular pieces, of a yellowish-white colour; very light, porous, and friable, and having a sweetish taste, somewhat like that of honey. It contains a peculiar form of sugar. It is nutrient, and in large doses a mild purgative, and is sometimes given as such to children.

ORPIMENT.—Sulphuret of arsenic.

ORRIS ROOT.—This is the root of the *Iris florentina*, and is imported to this country from Leghorn and Trieste. It has a violet odour, and is much employed to scent tooth-powders, &c. In large doses it is pretty acrid, and the practice of allowing children when teething to have a piece to cut their gums with, is sometimes followed by bad consequences.

ORYZA SATIVA.—See '*Rice*.'

OS SEPIA.—The substance called by this name in the shops is the shell of the cuttle-fish. It is cast in considerable quantities upon our shores, and, when powdered, is occasionally used as a dentifrice.

OSSIFICATION.—This is the formation of bone, but in pathology is applied to that perversion of nutrition in which bone is deposited in parts of the body where it ought not to be. This is most common in the cartilages of the ribs; indeed, these are almost always ossified in aged people. It is stated that this change never took place in Old Parr. The cartilages of the windpipe are also peculiarly prone to form bone. The tendinous tissues, too, are very liable to this change, and the cause of epilepsy is occasionally the formation of bone in the dura mater.

The valves of the heart are unfortunately prone to have bone deposited in them, and when this is the case it very materially injures their proper action, and induces dropsy, &c. The arterial coats, too, are liable to this change.

No treatment can prevent these depositions.

OSTREA.—See 'Oyster.'

OTTO OF ROSES.—The volatile oil of roses; correctly written, 'Attar of roses.'

OURALY POISON.—This is also written 'Woorali poison.' It is employed by the natives of Guiana, to render the wounds made by their arrows more fatal. The basis of it is the *Strychnos toxifera*. It produces paralysis of the muscles of respiration, and thereby induces death. If, however, artificial respiration be employed for some time, the respiratory muscles regain their power.

Ovis.—The sheep. See 'Sheep' and 'Suet.'

Ox.—This animal has been known and valued from the earliest times. It is mentioned often by Moses. It is of the greatest importance to man, not only as a beast of burden, but as supplying him with leather (see 'Leather,') milk (see 'Milk,') and beef.

Ox bile is occasionally employed in medicine. It merely contains some salts, &c., and it is not easy to tell why it should be used.

OXALIC ACID.—This acid was discovered by Scheele in 1776. It occurs in several plants, and was for long obtained from the sorrel. It is easily formed by the action of nitric acid upon sugar, and this is its present commercial source. It consists of three equivalents of oxygen united with two of carbon. It is formed in crystals which are colourless and transparent, have an extremely sour taste, and are excessively poisonous.

In its physical appearance it closely resembles Epsom salts, and accidents have frequently happened from mistaking the one substance for the other. The taste might at once discriminate between the two, the acid being intensely sour, and the salts extremely bitter.

Oxalic acid, if taken in large doses, is one of the

most rapidly acting poisons that we possess. It has been known to cause death in two minutes. "After death"—says Christison—"the stomach is found to contain black extravasated blood, exactly like blood acted upon by oxalic acid out of the body; the inner coat of the stomach is of a cherry-red colour, with streaks of black granular warts." If the acid be taken in a diluted form, there is no corrosion, but still it acts as a deadly poison. If in sufficient quantity, the heart seems to be paralyzed, and if in still less, a kind of narcotism seems to be induced.

The treatment of a case of poisoning by oxalic acid consists in administering lime, so as to form the insoluble oxalate of that earth, and the plaster of rooms always affords a supply of this antidote. And if vomiting be not spontaneously excited, emetics should be administered. The after treatment must be conducted upon general principles.

OXALIS ACETOSELLA.—This plant or wood sorrel is indigenous. It is said to be the genuine shamrock of the sister island. It has a very pretty white flower, with purplish veins, and grows in woods and shady places. Wood sorrel has no odour, but an agreeable acidulous taste; this latter property being owing to the presence in it of binoxalate of potassa. This salt is sometimes extracted from it, and sold in the shops under the name of essential salt of lemons, to remove ink stains and iron mould from linen. The plant is eaten as a salad, and an infusion of it, or a whey, made by mixing it with milk, is an agreeable drink in febrile disorders.

OXYGEN.—This very important element was discovered in 1774 by Priestley, who termed it *dephlogisticated air*. The following year it was also discovered by Scheele, who was quite ignorant of the result of Priestley's inquiries. By him it was named *empyreal air*. Afterwards, Lavoisier termed it oxygen—a name which it still retains, although it was bestowed upon it in consequence of a theory which is now exploded.

Oxygen is by far the most abundant element in nature, and it constitutes at least three-fourths of the terraqueous world. And of the atmosphere, oxygen constitutes about twenty-three per cent. by weight. Farther, in all living bodies it constitutes the greater part of their bulk.

Owing to the abundance in which it occurs, there are several modes of obtaining oxygen. The most convenient is to heat chlorate of potassa. When this is done, both the acid and base yield up their oxygen, which passes off in a gaseous form, and chloride of potassium is left behind.

The oxygen thus obtained is without odour, colour, and taste; incombustible, but a supporter of combustion. It is rather heavier than air, its specific gravity being 1.1. All animals require the influence of oxygen (as contained in the air) in order

that they may exist, and in the higher animals the privation of it for even a very short time induces death. As is well known, the air taken into the lungs parts there with its oxygen, and receives an equal bulk of carbonic acid.

The continued respiration of pure oxygen is injurious, and, if persevered in, fatal. The breathing becomes hurried, the circulation excited, and after a time this state of excitement is followed by debility; the respirations become feeble and slow; and last of all, insensibility intervenes, which is followed by death. When the body is examined, all the blood is found to be arterial.

At one time certain diseases were supposed to depend upon a deficiency of oxygen, and the gas was administered in them. This practice is now discontinued. The inhalation of oxygen, however, would probably be useful in asphyxia, arising from inhaling impure air,

OXYGEN WATER.—By charging water with oxygen gas, this oxygenated water may be obtained. It is a slight stimulant, and has sometimes been prescribed in atony, dyspepsia, &c.

OXYMEL.—Simple oxymel is made as follows:—

Acetic acid,.....One pint and a half.

Honey, clarified,.....Ten pounds.

Boil over a slow fire, removing the scum.

This oxymel is much used as an expectorant in slight colds, and as a vehicle for more active medicines. It is also used in cases of sore throat, and mixed with barley water, to form a drink in febrile diseases. Of the compound oxymels may be mentioned—

Oxymel of Colchicum.—Take of

Sliced fresh cornus of meadow saffron,.....One ounce.

Distilled vinegar,.....One pint (wine measure).

Clarified honey,.....Two pounds.

Macerate the saffron in the vinegar contained in a glass vessel for two days. To the liquor strongly expressed from the cornus add the honey, and boil down to the consistence of sirup, and strain. This is a Dublin preparation; and is calculated for cases of semi-acute rheumatism, coming on in asthmatic people.

Oxymel of Squills.—Take of

Honey,.....Three pounds.

Vinegar of squills,.....A pint and a half.

Boil down over a slow fire to a proper consistence. This is much used as an expectorant in chronic catarrhs and asthmas, and is sometimes given to children having whooping-cough, as an emetic.

OYSTERS.—These molluscous animals were greatly esteemed by the ancient Romans, and even in their time the superiority of the British ones, or "natives," was recognized. The flesh of them is generally regarded as very easy of digestion, and is one of the few articles of animal food that are eaten

raw. During May, June, and July they are spawning, and not fit for food.

Oyster shells are official. They contain nearly ninety-nine per cent. of carbonate of lime, to which they owe their efficacy.

PAIN.—"Of all the uneasy sensations," says Watson, "pain is the most common and important. It rarely happens that it is not felt, at one period or another, in inflammatory diseases; and it very often occurs, and is very acute too, when there is no inflammation at all. There are many kinds and degrees of pain. Different kinds of morbid affections are accompanied by different kinds of pain; and the same kind of morbid action—inflammation, for example—produces different modifications of pain, according as it affects different parts. The pain that belongs to inflammation of the lungs differs from that which is felt in inflammation of the bowels. Bones, muscles, tendons, ligaments, the bladder, the kidney, the uterus, all modify, in a manner peculiar to themselves, the pain that is produced in them by injury or disease. Different epithets are given to the different varieties of pain; *i. e.*, people endeavour to explain how they feel, by likening their sensations to something which they have felt before, or fancied they have felt. Thus, we hear of *sharp* pain, *shooting* pain, *dull* pain, *gnawing* pain, *burning* pain, *tearing* pain, and so on."

Pain very often is experienced in a different part from the one really affected. Thus, in disease of the heart, there is often pain running down the left arm; in hepatic affections, pain in the right shoulder; in inflammation of the hip-joint, pain in the knee; and in disordered stomachs, pain in the scalp.

PAINTERS' COLIC.—This disease has received a variety of names, as Devonshire colic, &c. As in this country it occurs most frequently among painters, it is best known here as the painters' colic. It is produced by the long-continued reception into the system of lead; although, in peculiar constitutions, a very short exposure has been known to have induced the disease. Thus, individuals have been known to become affected with it in consequence of sleeping, for a night or two, in a newly-painted room. On the other hand, Dr. Watson had a case, in which the man worked among lead for nineteen years before becoming affected.

At one time this disease was very common in Devonshire, where it was traced to the cider, there so commonly drunk, being impregnated with lead, owing to the cider vats containing that metal. At Poitou, it prevailed so extensively at one time, that a common continental name for the affection is, the colic of Poitou, in consequence of the wine there being mixed with preparations of lead, in order to prevent its turning sour. In this country

it is generally confined to painters, who use a great deal of carbonate of lead; glass-blowers, who use the oxide; workers in lead mines, and others exposed to lead.

The symptoms of it are violent colic, and, as has been before stated, if the cause be continued to be applied, paralysis. A very curious concomitant symptom is a blue mark, running along the edge of the gums, just where they meet with the teeth.

The treatment of lead colic consists in giving purgatives and opium alternately. In order to prevent the disease coming on, great attention should be paid to cleanliness, and the clothes of the workmen should be made of strong, compact linen, and washed frequently. Great care should also be taken to prevent any lead being taken into the system along with the food; and in order to do this, the hands should invariably be thoroughly washed before eating, and the meals should never be taken in the workshops.

It is also said that the liberal use of fat and oil is a prophylactic, and Liebig affirms that it may be prevented by the workpeople drinking sulphuric-acid lemonade. And in some lead works at Birmingham, where the disease was very prevalent, it was altogether stopped by adding sulphuric acid to the treacle beer, which the men used as a beverage.

PALM OIL.—This is now largely imported from Guinea, and is expressed from the fruit of the *Elais guineensis*. It is solid, of a deep orange colour, a sweet taste, and a pleasant odour. By the Africans it is used for food. It is occasionally employed here in cases of sprains, &c., but its principal use is in the arts.

PALM WINE.—By making incisions into the spathe, at the top of the stems, of several palms, a saccharine juice is obtained, which, when fermented, constitutes palm wine. The spirit obtained by the distillation of this is called arrack.

PALMA CHRISTI.—See 'Ricinus.'

PALMS.—These constitute a very important natural family of endogenous plants, that usually consist of woody trees. There is scarcely a species of palm that does not supply man with something useful. The cocoa nut and the date are valuable for their fruit; the leaves of many are much employed for thatching; another species afford sago, oil, dragon's-blood, wine, &c.; while the stems of others are used as timber, &c.

PALPITATION.—In general, the pulsations of the heart are not felt by an individual. Sometimes they are performed so much more forcibly, that they make themselves perceptible, and generally excite a sensation which is an unpleasant and distressing one. One of the most common examples of this is when one has been running. This, however, soon passes away. In various morbid conditions, the palpitations of the heart are longer continued and very distressing.

Palpitations are symptomatic of both organic disease of the heart, and of mere functional disorder; and in the great majority of cases it is the latter. Very often they are produced by dyspepsia, and in many instances they seem to be connected with drinking an excessive quantity of tea. They also occur in nervous people, in whom they often excite much alarm.

PALSY.—See 'Hemiplegia.'

PANCREAS, DISEASES OF.—The pancreas is an organ that is very seldom affected by disease. It is occasionally the seat of cancerous deposition, but the symptoms of such are not plain, and no treatment can be applied to them.

PAPAYER RHEAS.—This is the common red corn poppy, and is a very troublesome weed to the farmer. It perhaps possesses slight narcotic properties, but is valued in medicine only from its colour. A sirup is made of its petals, and is used to communicate a red colour, particularly to acid mixtures, acids having the property of making it still brighter.

PAPAYER SOMNIFERUM.—See 'Opium.'

PAPULE.—Those skin diseases characterised by little red elevations of the cuticle, and which contain no fluid.

PARACENTESIS.—Tapping.

PARADISE, GRAINS OF.—These are probably the seeds of two species of *Anomum*, that are indigenous in Africa. They are roundish in shape, have a shining, golden, brown colour, and an excessively hot taste. They contain a volatile oil and an acrid resin. The Africans employ them very much as we do pepper, and the common opinion with regard to their deleterious nature is erroneous. They are or were used in this country, to communicate an apparent strength to beer; and any brewer having them in his possession, is liable to a fine of £200; and any druggist selling them to a brewer, to one of £500.

PARALYSIS.—See 'Hemiplegia.'

PARALYSIS AGITANS, or SHAKING PALSY.—The pathology of this affection is not well understood. The following is Parkinson's definition of it:—"Involuntary tremulous action, with lessened muscular power in parts not in action; and, even when supported, with a propensity to bend the trunk forwards, and to pass from a walking to a running state, the senses and intellect being uninjured." The disease comes on insidiously, and, in its early stage, all that is noticed is a sense of weakness, and a disposition to trembling, sometimes in the head, but more commonly in the arm or hand. This gradually increases and extends, and in a little there is an inclination, especially in walking, to stoop. Then there is a difficulty in making the voluntary motions exactly obedient to the will. As the disease advances, this becomes still more remarkable; and in bad cases, there is complete

inability of maintaining the erect posture, and there is perpetual trembling of the head, or some other part.

Nothing very certain is known of either the pathology or treatment of this affection.

A very analogous disease is sometimes produced by the fumes of mercury, and is witnessed occasionally amongst workmen, particularly among water-gilders, as they are called. It generally comes on gradually; there is some difficulty felt in controlling the arms, and they shake a little. Then the power of locomotion becomes impaired, and at last all power over the voluntary muscles is lost, and any attempt to move sets the muscles into convulsions. The general health is also affected, and the skin becomes brown, and the teeth black.

Unlike the trembling palsy, mercurial tremor is a very curable disease; and if the patient be separated from the cause, and have tonics, he soon gets well.

PAREGORIC.—See 'Opium.'

PAIREIRA BRAVA.—This plant is a native of the West Indies and the Spanish Main. Its root is the officinal part, and is used as a tonic in chronic inflammation of the bladder.

PARSLEY.—The garden parsley, the *Petroselinum sativum* is a hardy biennial, much used as a pot-herb and as a garnish. Two kinds of it are cultivated, the common and the curled-leaved. The latter should be exclusively grown, as the plain variety is apt to be confounded with the *Æthusa cynapium*, or fool's-parsley, a poisonous umbelliferous plant.

PARSNIP.—This very hardy native plant, besides furnishing an esculent root for the table, yields a wine, from which a considerable quantity of spirit may be obtained by distillation.

PATENT MEDICINES.—Various compound medicines are sold in the shops, of which the composition is, as far as possible, kept secret. Properties are almost invariably assigned to them that have little or no foundation, and as they, nevertheless, often contain very active ingredients, the damage that they often cause is very great. Indeed, those who sell them are from time to time tried and found guilty of murder, but still their sale seems undiminished—one great cause of the high repute in which they are held being probably the secrecy and mystery that surrounds them. These patent medicines are so numerous that an account of them would extend to a great length, but the following summary will give the constitution of some of those that are in greatest demand.

Ague Drop.—This is Fowler's solution of the arsenite of potash, or the arsenical solution of the pharmacopœias; an excellent preparation when properly administered, but quite capable of producing fatal inflammation of the stomach, unless its effects are watched by an educated medical man.

Anderson's Pills.—These are composed of aloes, jalap, and oil of aniseed. A similar compound is known by the name of Hay's Pills, but in these the jalap is dissolved by means of spirit. Their actions are analogous to the common aloetic pill of the shops.

Bailey's Itch Ointment.—This is a mixture of saltpetre, alum, and sulphuret of mercury, mixed up with lard perfumed, and calomel. If the skin be broken, as is almost always the case in the itch, the mercury may be taken into the system, and very bad consequences result. Moreover, its efficacy is very doubtful. It is an improper and dangerous application.

Bailey's Antibilious Pills.—These are composed of colocynth, jalap, and tartar-emetica. They possess no advantage over the common rhubarb or colocynth pill of the shops. None of the officinal purgative pills contain tartar-emetica, nor is it easy to conceive what good purpose it serves, but almost all the quack "antibilious pills" have it as an ingredient.

Bateman's Pectoral Drops.—These are recommended in cases of chronic bronchitis, and consist of laudanum, disguised by camphor, aniseed, and cochineal. In acute inflammation of the air-passages they may be very dangerous, and there is always the fear of taking an overdose. The paregorics of the shops are far safer and better.

Bates' Anodyne Balsam.—Opodeldoc, at six times its proper price.

Brodune's Nervous Cordial.—This is a spirituous solution of bark, gentian, cardamoms, lavender, and a little muriate of iron. It is doubtless a tonic and stomachic.

Cephalic Snuff.—This is a mixture of common snuff with powdered assarabacca. It causes sneezing, and a good deal of discharge from the nostrils. It may be useful as an errhine.

Chelsea Pensioner.—This is a quack prescription for chronic rheumatism, that was recommended to Lord Anson (who seems to have been fond of quack remedies) by a Chelsea pensioner. It consists of a mixture of guaiacum, rhubarb, cream of tartar, and sulphur, flavoured with a little nutmeg, and mixed up with honey. In cases of chronic rheumatism, combined with intestinal derangement, it is probably a very good prescription.

Ching's Worm Lozenges.—There are two kinds of these—yellow and brown, the yellow being composed of calomel, and the brown of jalap. The former is ordered to be given to the child at night, and the latter in the morning. For ordinary cases of these parasites, such treatment is not improper, but bad effects might follow the indiscriminate use of such powerful remedies, and children are probably, from time to time, killed by such empirical practice.

Daffy's Elixir.—This is compound tincture of senna flavoured with treacle, elecampane, and aniseed.

Dalby's Carminative.—This is a mixture of aromatics and opium. Owing to its latter ingredient, its indiscriminate employment does a great deal of harm.

Dinner Pills, or Lady Webster's Pills.—To make these, six drachms of aloes, two each of mastic and red roses, with as much oil of wormwood as will form a mass, are mixed together. This mass is then divided into moderate-sized pills. It is a very good prescription.

Dixon's Antibilious Pills.—These very extensively used pills are composed of aloes, scammony, rhubarb, and tartar-emetic.

Essence of Coltsfoot.—This is a mixture of balsam of Tolu, and tincture of benzoin, or friar's balsam. It is, of course, very stimulating, and when given in acute affections of the lungs, is probably pretty generally fatal.

Essence of Mustard.—This is an external stimulating application, made of mustard, rosemary, and oil of turpentine. Its application in cases of chronic rheumatism, in which only it is likely to be applied, may be useful enough.

Ford's Balsam of Horehound.—This is another of the patent poisons. It is a paregoric elixir (containing much opium) combined with squills. It is a good deal used, and doubtless kills a good many people who venture to take it in cases of acute pulmonary affections.

Godfrey's Cordial.—This is a very dangerous quack medicine. It is a mixture of laudanum with treacle, sassafras, coriander, aniseed, and caraway seeds.

Gowland's Lotion.—This is a solution of corrosive sublimate, in almond mixture, and is used externally in cases of freckles. The various kalydors, as they are called, are probably identical in composition.

James' Pills.—These essentially consist of James' powder.

Lardner's Prepared Charcoal.—This and the other prepared charcoals of the shops, are a mixture of burnt bones, or animal charcoal, and carbonate of soda. They are very good dentifrices.

Morison's Pills.—The active ingredient in these too active pills is gamboge.

Peter's Pills.—These are very similar to the preceding, and have been a good deal superseded by them. They consist of aloes, jalap, gamboge, scammony, and a little calomel.

Pectoral Balsam of Liquorice.—This is paregoric flavoured with aniseed. If used, as it is, indiscriminately, it is a very dangerous formula.

Plunket's Cancer Ointment.—This is arsenious acid, mixed with some vegetable substances, and white of egg. Its application to an open cancer is simple murder.

Roché's Embrocation.—This is a mixture of oil of cloves, olive oil, amber, &c., sold for the purpose

of being rubbed upon the breasts of children who have got the whooping-cough.

Solomon's Balm of Gilead.—This once very famous nostrum is brandy with a little cardamom, and a very small portion of cantharides.

Speedman's Pills, or Chamomile Pills.—These are made of aloes, rhubarb, myrrh, and some chamomile.

Squire's Elixir.—This is another and a dangerous flavoured paregoric.

Stroughton's Elixir.—This is a liqueur, and is composed of a tincture of gentian, orange peel, cardamoms, &c.

Taylor's Red Bottle, or Whitwork Doctor.—This is nothing but common spirits flavoured with oil of origanum, and coloured with cochineal.

Ward's Drops.—Neither more nor less than friar's balsam, or compound tincture of benzoin.

Ward's Headache Essence.—Compound camphor liniment.

Ward's Paste.—Confection of black pepper.

Ward's Red Drops.—Antimonial wine, coloured with cochineal.

Warner's Cordial.—This is a spirituous solution of rhubarb and senna, flavoured and coloured with saffron, liquorice, and raisins.

Wilson's Gout Tincture.—This, as the other empirical nostrums for gout, contains colchicum, and may be very injurious.

PATHOLOGY.—The doctrine of disease.

PEACH.—The peach tree is the *Persica vulgaris* of botanists. Its very agreeable fruit, owing to the large quantity of free malic acid that it contains, is a refrigerant, and may be usefully given in febrile diseases. The leaves, when distilled with water, yield prussic acid. Both they and the blossoms are occasionally administered, but the practice is not a very safe one.

PEAR.—This fruit consists of sugar, malic acid, and mucilage, and when ripe is not difficult of digestion.

PEARL ASH.—This is an impure form of potassa, made by heating the black salts or wood ashes of commerce.

PEARL BARLEY.—This is common barley deprived of its husks, and then rounded and polished. It is employed in the sick chamber to make barley water, which is a valuable drink, particularly in inflammations of the mucous membrane. The official strength of it is about an ounce of barley to a quart of water. Sugar and lemons are usually added to it. There is also an official compound decoction of barley, which, besides barley, contains figs, liquorice, and raisins. This, besides being emollient, is slightly purgative.

PEARL WHITE.—The common name of the subnitrate of bismuth.

PEASE.—When immature, pease contain little nutriment, but are very digestible. When ripe,

they contain a large quantity of albuminous matter, and are therefore very nutritious, but to most people they are difficult of digestion. Bread made of pease, formerly the staple food of large districts in the south of Scotland, is now little used, oats and wheat being employed instead.

PEPPER, BLACK.—Common black pepper is the dried unripe berries of the *peper nigrum*, a small tree that is cultivated in both the East and West Indies. To obtain white pepper, the black peppers are soaked in water, some of which they absorb, swell, and burst their teguments; and as a considerable portion of the acidity is in this tegument or pericarp, white pepper is not so pungent as black. Both black and white pepper contain an essential oil, and a peculiar substance called pepperin. They are the most acrid of the spices. As a condiment they are extensively used to aid digestion, and in larger doses they are employed in medicine in disorders of the pelvic viscera. They are also anti-febrifuge, and an infusion of peppercorns in spirit has long been administered to prevent a paroxysm of ague.

PEPPER, CAYENNE.—This has no connection with the preceding, but is the powder of the bird pepper, a species of capsicum. It is a very acrid aromatic.

PEPPER, JAMAICA.—This is allspice or pimento. Besides being used in cookery, it is employed in medicine to relieve flatulence, and to cover the unpleasant taste of other remedies. There is an official oil, spirit, and water of it.

PERICARDITIS.—This very serious disease is acute inflammation of the investing membrane of the heart. It does not indeed often prove immediately fatal, but in the great majority of cases, certainly in more than ninety per cent., it causes death.

It may come on, like other acute inflammations, from exposure to cold, but its usual cause is acute rheumatism, or rather acute rheumatism so powerfully predisposes to it, that every one suffering from rheumatic fever is, unless great pains are taken, very liable to be attacked by this fatal malady.

In general, during an attack of acute rheumatism, in which the patient either exposes himself to draughts of cold air, or will apply cold to the affected joints, the heart affection makes its appearance very insidiously. A peculiar expression of countenance, a sort of strangeness of appearance mixed with distress, which is greater than can be accounted for, may be witnessed. Then a feeling of distress in the epigastrium, with a catch in the breathing, a dry cough, difficulty in lying upon the left side, and palpitation come on. There is pain over the region of the heart, increased by full inspirations, and pretty commonly by pressure upon the heart, by the fingers being thrust beneath the cartilages of the false ribs. There is commonly also pain in the left shoulder and left arm. Lastly, there are rough and sharp sounds, indicative of effusion of lymph,

to be heard upon auscultation, and the pulse is excited and often irregular.

Occasionally, head symptoms make their appearance, owing apparently to the circulation in the brain being affected.

It is important to know that the majority, perhaps, and certainly a great number of cases of pericarditis, come on after a rheumatic patient has been bled. And when the disease is set up, it is apt to be aggravated by general bleeding. The treatment most to be relied upon, consists in local bleeding, the administration of opium and calomel (and it is considered proper to keep the mouth sore some time in this disease), and the application of blisters. But in general, whatever treatment is adopted, the foundation of organic disease of the heart that will ultimately prove fatal, is laid in cases of pericarditis.

PERIPNEUMONIA NOTHA.—This is the name for a kind of bronchitis that occurs in aged people, and which is apt to prove fatal.

PERITONITIS, or inflammation of the peritonium, is a common and serious abdominal affection. It is characterised by pain in the abdomen, attended with fever and increased by pressure. The pain, too, is increased by sitting up, by extending the legs, or by the pressure of the bedclothes. Generally speaking, too, in order to prevent any pressure upon the abdomen, the breathing is entirely managed by the muscles of the chest, or, to use the technical expression, is thoracic. Peritonitis usually sets in with rigors and a hard pulse, but owing to the depressing effect of abdominal pain upon the circulation, the action of the heart soon becomes very much enfeebled.

It is for this last-mentioned reason that local bloodletting, save at the earlier part of the disease, is often impracticable. Topical bleeding is almost always necessary and useful, and scarcely secondary to it in importance, is the administration of opium, with which, if considered advisable, calomel may be combined. The quantity of opium that may be beneficially administered in this disease is often almost enormous.

There is also a chronic form of peritonitis, which particularly occurs in scrofulous patients. Pain and a sensation of fulness are felt in the abdomen, and the pain is increased by pressure. The digestion and assimilation of the food are usually imperfectly performed, and there is loss of appetite, and often nausea and vomiting. As the disease progresses, there is wasting and emaciation, a pale and sallow appearance, and an expression of languor. In its later stages dropsy is very liable to occur.

The treatment consists in applying counter-irritants, administering iodine, and in endeavouring to improve the general health.

PERUVIAN BARK.—One of the names of Cinchona, or Jesuits' bark.

PETROLEUM.—This is mineral or rock oil, which spontaneously exudes in springs in coal formations, and which is produced from the decomposition of coal. It is stimulating, and has been used in chronic pulmonary affections, skin diseases, &c.

PHTHISIS, or PULMONARY CONSUMPTION.—This incurable disease is unfortunately too common, and, from its extreme prevalence in this country, is sometimes called the "English disease." Phthisis, properly, merely means a *wasting*; but the term is now always restricted to a wasting that is dependent upon the deposition of tubercles in the lungs, and the ulceration consequent upon their presence in those organs. These tubercles are deposited in individuals of a scrofulous diathesis, or habit of body, although they may, perhaps, be induced in any one by long exposure to damp and cold, particularly if, at the same time, an insufficient quantity of food be taken. A number of small round tubercles are at first deposited, in a case of pulmonary consumption or phthisis, in the pulmonary vesicles. Several of these at length coalesce, and produce so much irritation, that ulceration begins, and pus is secreted, and cavities formed. Whenever this is the case, the patient is sure to become more and more emaciated, and eventually to die.

Of course, a good many general symptoms attend the deposition of these tubercles, and the suppuration and formation of the cavities. Of these, cough is generally the earliest and the most constant. Usually, at first, it is slight in its nature, occurs only occasionally, and is dry. It is generally first noticed in the morning, and when exposed to cold, and, during the warm weather of summer, will for a while often disappear; but if it is caused by tubercles, it gradually becomes worse, more constant, and is at last attended by the expectoration of pus.

A cough that is slowly developed in the manner just mentioned, is always strongly indicative of phthisis; but it is, by no means, necessarily so. A cough, dependent upon irritation in the stomach, sometimes imitates it, in its earlier stages, most exactly; and so also does the cough that frequently comes on in hysterical young women: but in neither of these cases is pus expectorated. In chronic bronchitis, however, there is often considerable expectoration of pus, but the history of such a case will generally differ widely from one of phthisis. The auscultatory sounds, however, afford the best means of diagnosis.

Another very common symptom of phthisis is spitting of blood. The blood, however, is not spit up, as commonly supposed, because a vessel has been, by ulceration, ruptured; but it is a morbid secretion from the mucous membrane of the lungs. In the immense majority of cases in which blood is expectorated, there are tubercles in the lungs; but it may occur independently of them, in cases of

heart disease, &c. Somewhat curiously, consumptive children hardly ever spit blood.

Most cases of phthisis are attended by stitch in the side, and some difficulty of breathing; but neither of these are characteristic symptoms, and occur in a great many other and less dangerous affections. The pulse, too, is almost invariably much quickened; but this, of course, may likewise happen in other chronic diseases.

More decidedly indicative of phthisis, are the extreme emaciation, and the hectic fever. The former of these is often very much greater than we would expect from any other symptoms that we can witness; and the latter is, in the great majority of cases, very strongly developed. Still, both emaciation and hectic fever occur in other chronic diseases, besides phthisis.

It is owing to these general symptoms being common to phthisis and other diseases, that cases have been mistaken for it, and, therefore, considered as cured. By means of auscultation, we can now, however, in almost all cases, discriminate between phthisis and other diseases. The tubercles are almost invariably deposited in the top of the lungs, and hence, in the early stages of the malady, we have dulness on percussion, and diminished respiratory murmur in these situations; and when these occur with the above general symptoms, we may be pretty certain of what is the matter.

Phthisis is a disease which varies a good deal in its duration. On the average, the time that intervenes between the first decided appearance of its symptoms, and its fatal termination, is under a twelvemonth. In a great number of cases observed by Louis, a few died within three months, and a few were ill several years, while the one-half were ill about nine months before they died. With regard to the age at which it comes on, the greatest number of deaths from phthisis occur between twenty and thirty, the next greatest number from thirty to forty, and then between fifteen and twenty, and fifty and sixty. It should be stated, however, that an immense number of young children die from it. It is more common among inhabitants of cities, than among those that live in the country, and more among females than males.

The preventive treatment of phthisis, among those predisposed to it, is by far the most important. Any scrofulous person, or any one who has lost relatives by it, should carefully avoid exposure to cold and damp—if possible, should remove to a warmer climate, and one in which the temperature does not suddenly change; and if this is not practicable, should imitate that, by carefully-regulated temperature within doors, and the wearing of a respirator when obliged to go out in cold weather. Then, of course, the general health must be kept up as well as possible, and violent labour, or excess of any kind, avoided. Flannel next to the skin,

as preventing sudden chilling, is usually recommended.

When the symptoms of phthisis appear *slightly*, there is no doubt but that the progress of the disease may be very much retarded. Climate is, perhaps, the great matter, and the tubercles may often be prevented from exciting ulceration by the passing the winter and spring in Madeira or Devonshire. The diet requires to be non-stimulating, but as nutritious as possible, and counter-irritation should be extensively and perseveringly applied to the chest. A course of iodine is always proper, and exercise upon horseback is sometimes remarkably beneficial.

In the latter stages, when the symptoms are well developed, we can only palliate. The cough is best relieved by opiates, and, perhaps, the most convenient form of these is the morphia lozenge of the Edinburgh pharmacopœia. The almond emulsion, too, is often very useful in this way. The dilute sulphuric acid is found to check, in many cases, the night perspirations; and when this does not answer, the tincture of muriate of iron often does. In the latter stages, wine is almost indispensable, and the preference should be given to port.

PIMPLES.—These are red elevations of the skin, which contain no fluid. They usually terminate in scurf. They are almost always dependent upon some disorder of the digestive functions, and are, therefore, best treated by antacids, purgatives, and tonics.

PLAGUE, or PESTILENCE, is so named on account of the extreme malignity of its nature. It is a violent typhoid fever, attended with very great depression, and accompanied by an eruption of carbuncles. It commences with shivering, which alternates with hot flushes; then the pulse becomes quickened, although it is generally, from the very first, feeble; and there is headache and depression of spirits. Next come on a burning pain in the pit of the stomach, low muttering delirium, and the breaking out of the carbuncles. In severe cases, however, death may take place before the carbuncles appear, and even as early as the second day after the seizure; and, in other cases, recovery may be retarded for two or three weeks.

The poor, and those who live in the midst of decaying animal matter and other filth, are invariably those who suffer most severely from plague. Poverty and dirt are, however, only predisposing causes, and the disease is, probably, always communicated by means of contagious emanations from individuals previously affected; and by the strict observance of quarantine laws, this country has not been visited by plague since 1665.

The treatment of plague is the same as that of typhus fever.

PLASTERS.—These are combinations of oily, resinous, and other matters, which are much more

tenacious and stiff than either ointments or cerates. They are used to give support, to stimulate, to blister, &c. The most important of the plasters kept in the shops are as follow:—

Adhesive Plaster.—Take of

Soap plaster,.....Two parts.

Resinous plaster,.....Three parts.

Mix and spread (now always with a machine) on linen. This is very much used for strapping, to give support, to keep lint in its place over ulcers and wounds, &c.

Court Plaster, or Black Sticking Plaster.—This is prepared by brushing a piece of black sarsenet over, first, with a solution of isinglass, and, afterwards, with a solution of benzoin in spirit. It is much employed to protect slight cuts and bruises from the air. It is also, owing to the benzoin, slightly stimulating.

Ammoniacum Plaster.—Take of

Ammoniacum,.....Five ounces.

Distilled vinegar,.....Eighteen ounces.

Dissolve the ammoniacum in the vinegar, and then evaporate over a slow fire, constantly stirring, until it has become of a proper consistence. This is a stimulating plaster, and, when applied over chronic tumours, sometimes causes their absorption. It is said to be particularly useful in cases of housemaids' swollen knee. A somewhat similar plaster is sometimes used in like cases, which contains, besides ammoniacum, mercury.

Aromatic Plaster.—Take of

Frankincense,.....Three ounces.

Yellow wax,.....Half an ounce.

Powdered cinnamon,.....Six drachms.

Oil of allspice, } Of each two drachms.

Oil of lemons, }

Melt the frankincense and wax together, and strain, and when they are cooling mix in the cinnamon and oils. It is spread upon leather, and applied over the pit of the stomach in cases of flatulent dyspepsia.

Belladonna Plaster.—Take of

Extract of belladonna,.....An ounce and a half.

Resin plaster,Three ounces.

Add the extract to the plaster, melted by the heat of a water-bath, and mix. It is anodyne, and is applied for the relief of rheumatic and neuralgic pains.

Fly-Blistering Plaster.—Take of

Powdered cantharides,.....A pound.

Plaster of wax,A pound and a half.

Lard,Half a pound.

The plaster and the lard are to be mixed together, and the cantharides added while the mixture is cooling. It is used for the purpose of raising blisters, but, at present, the *Tela vesicatoria* is very

much substituted for it, and this has the advantage of having no disagreeable smell, which the plaster has.

Warm Plaster.—Take of

Cantharides plaster,.....One part.
Burgundy pitch,.....Seven parts.

Melt at a low heat, and mix. This is employed as a stimulating plaster in local pains.

Galbanum Plaster.—Take of

Galbanum,Eight ounces.
Lead plaster,.....Three pounds.
Common turpentine,.....Ten drachms.
Resin of spruce fir,Three ounces.

Add first the resin of the spruce fir, then the plaster of lead, melted at a slow fire, to the galbanum and turpentine, previously mixed together, and mix. This is spread upon leather, and applied, as a mild stimulant, particularly to the chest in chronic pulmonary affections, and also to the back of weak and rickety children.

Lead Plaster, or Diachylon Plaster.—Take of

Oxide of lead,.....Six pounds.
Olive oil,.....One gallon.
Water,.....Two pints.

Boil over a slow fire, and constantly stir, until it is reduced to a proper consistence. During this process, a lead soap is formed. Spread upon linen, this plaster has been used for nearly two thousand years as an adhesive plaster, a purpose for which it is well qualified, as it rarely produces any irritation.

Opium Plaster.—Take of

Opium, powdered,.....Half an ounce.
Resin of spruce fir, powdered,.....Three ounces.
Lead plaster,One pound.
Water,Eighteen ounces.

Add the resin of the spruce fir, the opium, and the water, to the melted plaster of lead, and, with a slow fire, boil down to a proper consistence. This is used occasionally, as a topical anodyne, in cases of chronic rheumatism, neuralgia, &c.

Strengthening or Iron Plaster.—Take of

Lead plaster,Two pounds.
Frankincense,Half a pound.
Red oxide of iron,.....Three ounces.

Mix. This is very much employed, spread upon leather, in rheumatism of the back, weakness of the joints, muscular weakness, &c.

Pitch Plaster.—Take of

Burgundy pitch,.....Two pounds.
Resin of spruce fir,One pound.
Resin,.....} Of each four ounces.
Wax,.....}
Expressed oil of nutmeg, One ounce.
Olive oil,.....} Of each two ounces.
Water,.....}

Melt the pitch, resin, and wax together, then add

the resin of the spruce fir, then the oil of nutmegs and the olive oil and water, and next boil down to a proper consistence. This is used as a slight but elegant and convenient counter-irritant, in cases of chronic pulmonary affections, lumbago, chronic pains, &c.

PLETHORA.—This is the name given to that morbid state of the system, in which there is too much blood. Its presence is indicated by the distention of the face, the full, bounding pulse, and the swelling of the veins. It is very often associated, too, with the tendency to the deposition of an excess of fat. It is often, likewise, frequently attended by ringing of the ears, fits of dimness of vision, and vertigo. The treatment for it consists in low diet and much exercise.

PLEURA, INFLAMMATION OF, or PLEURISY.—The serous membrane of the pleura, particularly in robust individuals, is liable to become inflamed, when its possessor has been exposed to cold and damp. The disease usually commences with rigors, which are followed by pain in the chest, difficulty of breathing, a cough, which is attended by great pain, difficulty of lying in particular positions, and inflammatory fever. The pain in the side is usually termed a stitch, and is generally felt (although not always) just beneath one of the breasts. The cough is nearly or entirely dry. At the beginning of the disease, a patient cannot lie on the affected side; but in a little after effusion has taken place, his condition, in this case, is reversed, and he cannot lie upon the sound side, because, when he tries to do so, it increases the dyspnoea. The auscultatory signs that attend pleurisy are interesting, but are sufficiently noticed in the body of the work.

The treatment of pleurisy is the same as that of other acute inflammations.

PLICA POLONENSIS.—A curious disease of the hair, that occurs in Poland and the adjoining countries, in which the hairs get matted together. It only occurs amongst dirty people.

PLUMMER'S PILLS.—Calomel pills. See 'Pills.'

PLUMS.—The fruit of the *Prunus domestica*. When dried, they constitute prunes, and are used as adjuncts to purgative preparations.

PNEUMONIA is inflammation of the substance of the lungs, and is a very severe and dangerous disease. It is usually preceded by shiverings, followed by heat of the surface, and fever; some pain in the chest, and a good deal of oppression in it. There is cough, at first dry, but soon attended by the expectoration of matter having the colour of rusty iron; and there is pain, aggravated by motion, coughing, or lying upon the affected side.

Pathologists have traced in pneumonia three distinct stages: first, one of simple congestion, then one of deposition of fibrine, and then of suppuration. The first of these is characterized by the peculiar sound, called crepitation.

Sometimes, indeed, not unfrequently, the fever that accompanies inflammation of the lungs is of a typhoid nature, from almost the commencement of the disease; and this is particularly the case in aged and enfeebled people.

The treatment of cases of pneumonia, in which the attendant fever is of an inflammatory nature, is copious bloodletting; and if it be employed early, there is scarcely any other disease in which the good effects of this proceeding are so very apparent and clear. In such cases, in addition to general depletion, the application of leeches and cupping-glasses is usually made use of, and the diet and regimen are of the most antiphlogistic order. Next in importance, if not almost equal, to bleeding, is the exhibition of tartarized antimony, in nauseating doses. Mercury, too, is very often exhibited, but its utility is, perhaps, most marked when the disease has advanced to its second stage; *i. e.*, that of the deposition of lymph. In this stage, too, blisters are often very serviceable. But in those cases that are attended by typhoid fever from the first, or in which the fever becomes so at a later stage, our main trust must be in the exhibition of stimulants, although, even in such cases, the tartarized antimony is generally very useful.

Poisons.—A poison is a substance which, when introduced in small quantity into the system, produces death. The following is a list of the more important ones, with the symptoms that they bring on, their antidote when there is such, and the treatment that ought to be adopted:—

1. *Acid, Hydrocyanic.* (Also, Oil of Bitter Almonds, Cherry-Laurel Water, and other Substances containing it.)

Symptoms.—Immediate insensibility, convulsive respiration at long intervals, and, in general, speedy death.

Antidote.—None.

Treatment.—The immediate application of stimulants, such as ammonia, to the nostrils; if practicable, making the poisoned person swallow brandy, or other spirits; and dashing cold water upon the head, chest, and spine.

2. *Acid, Hydrochloric, Muriatic or Spirit of Salt.*

Symptoms.—Burning heat in the epigastrium, extending to the throat, vomiting of bloody matter, tongue swollen and dry, great thirst, difficulty of swallowing, small pulse, cold skin.

Antidote.—Chalk, magnesia, or soap.

Treatment.—As a case of inflammation of the stomach.

3. *Acid, Nitric, or Aquafortis.*

Symptoms.—Intense burning pain from the throat to the stomach, vomiting of bloody matter, great pain in the stomach on pressure; the mucous membrane of the mouth is white; there is difficulty of

speech and power of swallowing; the tongue is swollen; and, as the case advances, the pulse becomes small, and the surface cold.

Antidote.—Chalk, magnesia, or soap.

Treatment.—As a case of inflammation of the stomach.

4. *Acid, Oxalic.*

Symptoms.—If taken in a large dose, a hot, burning sensation, and vomiting, begin almost immediately. Great pain in the stomach, with extreme depression of strength, come on almost immediately, and then a fatal stupor, often attended with convulsions, follow. A smaller dose acts more like an ordinary irritant poison.

Antidote.—Chalk, lime, or magnesia.

Treatment.—After the antidote has been administered, the case must be treated upon general principles.

5. *Acid, Sulphuric, or Oil of Vitriol.*

Symptoms.—Violent burning pain, extending from the fauces to the stomach; retching, and vomiting of coffee-ground coloured fluid, mixed with blood, and which effervesces if it fall upon marble, and stains a black dress. The lining membrane of the mouth is at first white, but subsequently becomes brown. There is great difficulty in speaking, swallowing, and breathing, and the stomach immediately rejects everything that is taken. At a later stage, there is small pulse, and a cold, clammy surface. The intellectual functions remain unimpaired to the last.

Antidote.—Chalk, magnesia, or soap.

Treatment.—As a case of inflammation of the stomach.

6. *Alcohol.*

Symptoms.—More or less complete coma.

Antidote.—None.

Treatment.—The evacuation of the stomach by means of the stomach-pump, or, if that cannot be had, by emetics. Stimulants must then be applied, the extremities kept warm, and a little cold water dashed upon the face from time to time.

7. *Ammonia, or Hartshorn.*

Symptoms.—Burning heat in the epigastrium and throat, quick and feeble pulse, cold surface, and in a little the lips, tongue, and fauces become swollen, soft, and red.

Antidote.—Some mild acid, as vinegar or lemon juice.

Treatment.—As a case of inflammation of the stomach.

8. *Arsenic, or White Arsenic.*

Symptoms.—First, there is faintness, nausea, and sickness, with a burning pain in the pit of the stomach. Then the pain becomes more severe, and brown matter, tinged with blood, is vomited, and there is usually diarrhœa. There is great thirst, a

small pulse, and there are often, towards the close of the case, nervous symptoms.

Antidote.—Probably none; but the hydrated sesquioxide of iron is held by some to be such.

Treatment.—If vomiting does not occur from the effect of the poison, it must be excited by means of emetics or the stomach-pump, and then promoted by means of tepid diluents. The case must afterwards be treated as one of inflammation of the stomach and peritoneum.

8. *Cantharides, or Spanish Flies.*

Symptoms.—A burning sensation in the throat, with extreme difficulty of swallowing; nausea, vomiting, and pain in the abdomen, with much thirst, and occasionally salivation. There is also great irritation in the bladder, &c.

Antidote.—None.

Treatment.—First remove the poison from the stomach, and then give large quantities of mucilaginous fluids, and also opium; and if the symptoms warrant it, bleeding will be necessary.

9. *Copper, Sulphate and Acetate of, or Blue Vitriol and Verdigris.*

Symptoms.—These salts of copper are irritant poisons, like arsenic, but they produce even more violent vomiting.

Antidote.—White of egg, or milk, or very strong coffee.

Treatment.—After administering the antidote, the case must be treated as one of gastric inflammation.

10. *Lead, Salts of, or Sugar of Lead, White Lead, &c.*

Symptoms.—In a large dose, these lead salts act as irritant poisons.

Antidote.—Epsom salts, or any sulphate.

Treatment.—After administering the antidote, or exciting vomiting, a case of lead-poisoning, from one large dose, requires treating as one of gastric inflammation.

11. *Mercury, or Quicksilver, Bichloride of, or Corrosive Sublimate.*

Symptoms.—A few minutes after the poison has been swallowed, a strong metallic taste is felt in the mouth, with a sense of constriction and burning in the throat. Soon after, violent pain is felt in the abdomen, with vomiting of bloody mucus, and diarrhoea. The pulse speedily becomes feeble and small, and the surface cold. If the case last long enough, salivation will come on.

Antidote.—White of egg or milk.

Treatment.—After administering the antidote, the symptoms must be treated upon general principles.

12. *Opium, including Laudanum, Paregoric, Godfrey's Cordial, &c.*

Symptoms.—Giddiness, drowsiness, and stupor, which end in perfect insensibility. In this last

state, there is stentorous breathing, a slow and full pulse, and the pupils of the eye are generally contracted.

Antidote.—None.

Treatment.—The most essential matter is to take the poison from the stomach, either by means of a stomach-pump or emetics. Then the tendency to lethargy must be prevented by keeping the poisoned man in constant motion, and the administration of strong tea and coffee.

13. *Silver, Nitrate of, or Lunar Caustic.*

Symptoms.—It corrodes every part of the body it comes in contact with.

Antidote.—Common salt.

Treatment.—If, after the antidote have been administered, any corrosion have taken place, such must be treated on general principles.

PONTEFRAC T LOZENGES.—Prepared and refined liquorice. They are very useful in chronic coughs.

POPPY, WHITE.—This plant is figured in Plate XXI. See 'Opium.'

PORT.—See 'Wine.'

PORTER.—This malt liquor derives its name from being the favourite beverage of porters and working men in London, and other English large towns. It is characterized by its dark-brown colour and bitter aromatic taste; properties which it derives from being brewed from very high-dried malt. When not adulterated, it is a wholesome and tonic beverage.

PORTLAND POWDER.—A compound of bitters, formerly much used by individuals of a gouty diathesis. See 'Gout.'

POTASH.—This is sometimes called the vegetable alkali, owing to its being derived from the ashes of wood. It is always obtained from the carbonate, by adding fresh-burned lime to a solution of that salt. The carbonate of lime falls to the bottom, and the solution of potash that is left constitutes the liquor potassa of the shops. When this liquor potassa is evaporated, caustic potash, in a solid form, is obtained.

Liquor potassa, well diluted, is used as an antacid, and the caustic potash is employed as an escharotic in poisonous wounds, to make issues, &c.

POTASH, CARBONATE OF.—This is sometimes named salt of tartar. It is prepared from wood ashes. It is used as an antacid, and in the formation of effervescing draughts.

POTASH, NITRATE OF.—See 'Nitrate.'

POTASSIUM.—The metal of which potash is the oxide.

POTATO.—The tuber of the *Solanum tuberosum*. Potatoes were introduced into Europe by Sir Walter Raleigh, in 1586. The tissue of the tubers is cellular, each cell containing ten or twelve grains of starch, and both the cells and the space between them likewise contain albuminous matter. By

boiling, the starch swells, and the albuminous matter coagulates; and when these changes are completely performed, as is the case in a good potato, we have the state called mealiness produced.

As an article of food, potatoes are nutritious and digestible. Their starch is sometimes extracted, and either sold as starch or converted into British tapioca. They are sometimes fermented, and a spirit distilled from them, which forms the basis of the so-called British brandy.

POWDERS.—In the language of pharmacy, a *puleis*, or powder, is a mixture of two or more powdered drugs, mixed together according to the official directions of the pharmacopœia, and kept ready for use in the shops. The most important of them are—

1. *Compound Aloes Powder.*—Take of

Aloes,An ounce and a half.
Guaiacum resin,One ounce.

Compound cinnamon powder, Half an ounce.
Rub the aloes and resin separately to powder, and then mix them with the compound cinnamon powder. This preparation is purgative and sudorific.

2. *Compound Antimonial Powder, or James' Powder.*—Take of

Sesquisulphuret of antimony, ...One pound.

Hartshorn shavings,Two pounds.

Heat together in a crucible. The action that takes place is complex, and may here be omitted. The preparation is intended to resemble the famous quack powder of Dr. James, which acquired such a reputation, about a century ago, as a sudorific in cases of colds and fevers. It is still pretty much employed in such cases, and in rheumatism; but its action is very uncertain, it sometimes producing copious perspiration, and at others having no action whatever.

3. *Compound Cinnamon, or Aromatic Powder.*—Take of

Cinnamon,Two ounces.

Cardamoms,One ounce and a half.

Long pepper,Half an ounce.

Rub together until a fine powder is made. This is aromatic and carminative, and much employed as an adjunct to purgatives, particularly in the case of children.

4. *Compound Scammony Powder.*—In the London and Dublin Colleges, this is a mixture of jalap, scammony, and ginger. The official Edinburgh preparation is composed of scammony and bitartrate of potash, and is the old "Warwick Powder," and when calomel is added, the "Royal Powder." All these are cathartic.

5. *Compound Chalk Powder.*—Take of

Prepared chalk,Half a pound.

Cinnamon,Four ounces.

Tormentil, } Of each three ounces.

Acacia, }

Long pepper,Half an ounce.

Mix. This is an aromatic and astringent preparation, very much employed in the diseases of children. There is also an official preparation, entitled "Compound Chalk Powder with Opium," every forty grains of which contain about one of opium.

6. *Compound Ipecacuanha Powder, or Dover's Powder.*—Take of

Powdered ipecacuanha, } Of each a drachm.

Do. opium, }

Do. sulphate of potash, ...An ounce.

Mix. This is the most certain of the official sudorifics. Every ten grains contain about one of opium.

7. *Compound Jalap Powder.*—Take of

Jalap,Three ounces.

Bitartrate of potash,Six ounces.

Ginger,Two drachms.

Rub them separately to powder and mix. This is a hydragogue purgative.

8. *Compound Kino Powder.*—Take of

Kino,Fifteen drachms.

Cinnamon,Half an ounce.

Hard opium,One drachm.

Rub them separately to a fine powder and mix. This is a valuable astringent preparation. Every twenty grains contain one of opium.

9. *Compound Rhubarb Powder, or Gregory's Powder.*—Take of

Magnesia,One pound.

Ginger in fine powder,Two ounces.

Rhubarb do.Four ounces.

Mix them thoroughly, and preserve the powder in well-stopped bottles. This is a very valuable antacid and mild purgative.

10. *Compound Tragacanth Powder.*—Take of

Tragacanth, bruised, ... } Of each one ounce

Gum arabic, do., }

Starch, } and a half.

Pure sugar,Three ounces.

Rub the starch and sugar to powder, then add the powdered gums and mix. Used as a vehicle for giving active and heavy powders—as, for instance, calomel—to children.

PRUNES.—These are dried plums.

PRURIGO.—This is a very distressing skin affection, which is characterized by almost intolerable itching. Sometimes the part of the skin that is so affected presents no peculiar appearance, but generally there are papulæ. It attacks various parts of the body.

In most instances of prurigo, there is some disorder of the digestive functions, and the treatment in such cases consists in endeavouring to remove this. Of all local applications, a solution of chloride of lime is perhaps the most useful in alleviating the tickling.

PRUSSIC ACID.—See 'Hydrocyanic acid.'

PSORA.—See 'Itch.'

PTUISAN.—A diluent drink, very much employed in continental practice, mainly as a placebo. It is variously prepared and flavoured.

PULSE.—"Every body knows," says Watson, "how much importance is attributed to the arterial pulse. It is expected of us, as a matter of course, that before we think of prescribing for a patient, we should, at any rate, feel his pulse. And really the information obtained by that little touch of the wrist, is often of the most interesting and instructive kind. But it requires practice and intelligence to appreciate that information. The qualities that we most attend to in the pulse are its frequency, its regularity, its fulness, and its force. It is necessary that we should know the number of beats which the heart habitually makes in health, for it varies much in different persons. The average number of pulsations in a healthy adult is from 70 to 75; but there are persons who, when they are quite well, have always a pulse of 80 or 90, and there are others in whom the pulse seldom rises above 60. In early life, the pulse is more frequent; in old age it is more slow than the standard I have given. *Cæteris paribus*, its beats are more numerous in the standing, than in the sitting position; in the sitting, than in the recumbent. If we do not inform ourselves of these peculiarities, we may fall into great mistakes. In disease, the pulse may acquire a degree of frequency which is scarcely calculable, and the less so, because, when it is extremely frequent, it is also extremely feeble; it will reach 150, 160, or even 200 beats in a minute. In other cases, as in apoplexy sometimes, and in some organic affections of the heart, the pulse will become extremely slow. The slowest pulse I ever felt was that of a man sixty-eight years old, who was for some time a patient of mine with diseased heart and dropsy. His pulse was often no more than 25 in the minute. He died suddenly in his chair, and I was very desirous of examining his body, but his widow would not allow it.

"In the seventeenth volume of 'Duncan's Medical Commentaries,' a case is related, in which the pulse was as slow as 9 beats in the minute. . . . Irregularity of the pulse is another condition which is often full of meaning and interest. . . . Irregularity of the pulse is natural to some persons. I have a brother who enjoys very good health, and whose pulse is habitually irregular; I have been told that when he was ill with a fever, at school, it became regular. I have heard of several precisely similar cases. There are two varieties of irregular pulse: in one, the motions of the artery are unequal in number and force, a few beats being from time to time more rapid and feeble than the rest; in the other variety, a pulsation is from time to time entirely left out—the pulse is said to intermit. These

two varieties may coincide in the same person, or they may exist independently of each other.

"Irregularity of the pulse may be caused by disease within the head, by organic disease of the heart, by simple disorder of the stomach, or it may be merely the result of debility, and the prelude to the complete stoppage of the heart's action from asthenia. How important must it be to ascertain and construe each of these meanings of the same symptom! It may indicate mortal disease; it may imply no danger at all; it may afford no clue to any available treatment; or it may teach us how to ward off impending dissolution.

"Another most important quality of the pulse is what is called its hardness or incompressibility. You find that you can scarcely abolish the pulsation by any degree of pressure; the blood still forces its way through the artery beneath your finger. Sometimes it is felt to strike a large portion of the finger, and then we say that the pulse is full or large, as well as hard. When it strikes a very narrow portion of the surface of the finger, it is compared to a thread; it is a small pulse, and if, at the same time, it be hard, such a pulse is often described as a wiry pulse. It requires some education of the finger to appreciate with exactness the several varieties of the pulse, even those which are practically important; for many have been mentioned by authors which are purely fanciful, or useless and unnecessary refinements.

"Now, the hard pulse . . . It is one of the best warrants we have, in many cases, of the propriety of bleeding our patient. It does not occur, however, in all inflammations, and it may occur when there is no inflammation. . . . It is, however, at all times considered so much a guide to our practice, that, whenever it occurs, it is very necessary to make careful inquiry into its real cause."

PUNICA GRANATUM, or the Pomegranate, has been employed in medicine from time immemorial. It is a native of Africa, but is now naturalized in Europe. Many parts of it were formerly employed; but although the flowers are still official in the Dublin pharmacopœia, the bark of the root is only employed in actual practice. A pint of the decoction of this is, perhaps, the best remedy that we possess against tape-worm.

PURGATIVES.—These remedies are sometimes arranged into seven groups—the laxatives, the saline purgatives, the milder acrid, the stronger acrid, or drastic, the mercurials, and the cholagogues, or promoters of the flow of bile.

PURPURA.—This remarkable disease is characterized by the appearance on various parts of the skin, and also in the mucous membrane of the mouth, of spots and blotches, exactly similar to those produced by a blow or bruise, which do not disappear when pressed, and which are caused by effusions of blood. There is also a great tendency

to hæmorrhage. The disorder depends upon some morbid state of the blood, and is very analogous to sea-scurvy. It is treated by the mineral acids, and tonic medicine and regimen.

PUS is one of the fluids poured out during a certain stage of inflammation. It is of the consistence of cream, and opaque, smooth, and yellow; when it is forming in an abscess, there is usually darting pain felt. See 'Inflammation.'

PUSTULE.—An elevation of the cuticle, having an inflamed base, and secreting pus.

PYLORUS.—This is the end of the stomach, next to the small intestines.

PYROLIGNEOUS ACID.—This strong vinegar is obtained from the destructive distillation of wood.

PYROSIS, OR WATER-BRASH.—This is a form of dyspepsia, distinguished by the exudation of a thin watery liquid. There is also often a good deal of pain felt in the stomach. Sometimes, too, it is a symptom of organic disease. Ordinary cases of it are generally benefited by the exhibition of white bismuth, and the compound kino powder.

QUACK.—Mercury, or quicksilver (in German, *quicksaller*), was not used internally in medicine until the time of Paracelsus. He was an ignorant and abandoned cheat, and hence irregular practitioners gradually came to be called quacks.

QUARANTINE.—Quarantine regulations are intended to prevent the transmission from one country to another of contagious effluvia, by means of men, animals, goods, or letters. The men and animals, coming from a country or port where the plague is raging, are confined in an isolated spot, until a sufficient time has elapsed for the disease, supposing they are going to take it, to break out, and the goods are subjecting to a purifying process. Of late years, cholera has also been a disease which has been subjected to quarantine regulations. On a small scale, too, in this country, the typhus fever, and other contagious diseases, are often kept out of public institutions by imitating quarantine modes of procedure.

The time during which plague can remain latent in the human constitution is probably not more than a fortnight, and ships coming from the Levant, and in which the plague does break out, the disease generally appears within a day or two of leaving port, and hence the usual period of quarantine is from ten to twenty days; but it is common, when a vessel arrives from a port where the plague is very bad, to completely isolate the crew and passengers for forty days; and this is the origin of the expression, quarantine.

The goods on board a ship, with a foul bill of health, are well exposed to the air, and letters are fumigated, and sometimes have vinegar thrown upon them.

In the Mediterranean, where, from the prevalence of plague, large quarantine establishments are

necessary, the name given to the requisite buildings for the purpose is a lazaretto. This usually consists of several detached buildings, with courts, and is surrounded by a high wall; or, if practicable, the whole establishment is situated in an isolated rock or small island. The officials of the place are closely confined to it, and never allowed to visit the town. The whole is placed under strict regulations, and violations of them are severely punished, sometimes, indeed, by death. The two largest lazarettos are at Malta and Marseilles.

The following account of a land lazaretto is interesting. It is quoted from one of Mr. Murray's "Handbooks:"—"Outside Orsova, by the water-side, and near the ferry over the Danube, stands the Pantalonium, a wooden shed, in which the market is held three times a week. On account of the quarantine regulations, the inhabitants of Servia and Wallachia are prevented coming into contact with the subjects of Austria, and dare not cross the frontier without an escort. The Austrian quarantine is five days for those who come out of Wallachia, and ten for those of Servia, increased to forty days in time of plague. The Wallachians, again, have a quarantine of five days against the Servians; so that none of the three parties can intermix, for the purpose of buying and selling, nor can they touch each other's goods. On this account, the building where the market is held is divided by three partitions, breast high, behind which the dealers of the three nations are congregated. In an open space in the centre is a table, by the side of which the Austrian quarantine officers take their stand, aided and supported by a guard of soldiers, with fire-arms and fixed bayonets, to enforce order and obedience. Whenever a bargain is made, the money to be paid is handed to one of the attendants, who receives it in a long ladle, transfers it to a basin of vinegar, and, after washing it, passes it on to the opposite side. The goods to be purchased are placed within sight, and are immersed in a tub of water, or fumigated, when they happen to change owners. It is an amusing sight to see the process of bargaining thus carried on by three parties, at the distance of several yards from one another, attended by the vociferation and gesticulation inseparable from such business. When the bartering is transacted, the Wallachians are escorted back to their own territory, as they had previously been in coming to the spot, by a guard of soldiers, and the Servians recross the river in their boats."

QUASSIA.—This is the wood of the *Picrana excelsa*, a large timber tree that grows in Jamaica. It is imported here in billets, is of a whitish-yellow colour, has no odour, and an intensely bitter taste, which last property it owes to a peculiar principle, called quassite. Upon many animals, particularly upon insects, it acts as a deadly poison; and even upon man, it has a sedative action. But in the

human species it is one of the best of the pure bitters, and is much used in chronic derangements of the digestive organs, and it is one of the few with which the preparations of iron may be combined.

QUEEN OF HUNGARY'S WATER.—This is used as a perfume, as a restorative in fainting, and as a liniment. It is a spirituous solution of rosemary.

QUERCUS.—See 'Oak.'

QUINCE.—The fruit of this tree is used in cooking, and its seeds are officinal, owing to a peculiar form of mucilage that they contain. A solution of this mucilage is applied to sore nipples, cracked lips, and the like. It is also used by hairdressers, like bandoline.

QUININE.—The active principle of cinchona bark. What is commonly called quinine is the disulphate. It sits much more readily on the stomach than the bark, and is now, almost universally, substituted for it.

QUINSEY.—See 'Cynanche.'

RADIATA.—Radiate animals are so named from their being disposed in rays. It is rather remarkable that no officinal substance is obtained from the Radiata.

RADISH.—This is the *Raphanus sativus*, the root of which is a very common article of diet. Radishes contain little nutriment, but they are pungent and acrid, and act with most people as a slight stimulant to the digestive organs.

RAISINS are dried grapes. Two kinds are sold in the shops; the larger or common ones, and the smaller or Corinthian, or *currants*, as they are popularly called. Raisins form an ingredient in several officinal compounds, but only for the sake of their flavour.

RASH.—This name is given to those skin affections that are characterized by having superficial red patches, of various figures, irregularly scattered over the body, and having intervals of natural-looking skin between them. They end in disqualification. Measles and scarlet fever are both instances of rashes.

RASPBERRY.—The fruit of the *Rubus idæus*, an indigenous plant. It is used in cookery, and when mixed with vinegar and water, as a cooling drink in febrile complaints.

REFRIGERANTS.—"Under this head," says Pereira, "are included those medicinal agents which diminish the temperature of the body, when preternaturally increased. The only agent which, in all cases, reduces animal heat, is cold, used in the form of ice, cold air, cold baths, cold lotions, cold drinks, &c. Its agency is obvious; it abstracts heat, and thereby lowers the intensity of the vital movements, diminishes vascular action, and reduces the calorific functions. But there are certain medicinal substances, which, by continued internal use, allay febrile heat, and usually promote the secretions,

though they have no power of diminishing the ordinary or healthy temperature; and to these the term refrigerant (or temperate) is usually applied. How they act is not completely understood. Dr. Murray thought that they furnished oxygen to the system, and in that way prevented so large a quantity of it being consumed in the process of respiration."

The refrigerants form rather a large class of medicines. Almost all the acids possess the property in question, and so also do many neutral salts; but above all, of these latter, perhaps, saltpetre is the most effectual. And as most of the acids and saltpetres are rich in oxygen, their action would seem to confirm the views of Dr. Murray. But many other substances, as sorrel, tamarinds, lemons, oranges, &c., are likewise refrigerants; and it is not easy to explain their action, unless by supposing that their refrigerant property is owing to the acid that they contain.

REGIMEN.—See 'Diet,' and 'Antiphlogistic Regimen.'

RESINS.—These drugs may be divided into four groups; the resins proper, the oil resins, the balsams, and the fetid gum resins. Of the first, common resin, or colophony, and gualiacum, may be taken as examples. The oil resins are semiliquid, and two of them, the turpentine and copaiva, are a good deal used in medicine. The balsams are characterized by containing, besides resin, benzoic acid, as benzoin and tolu; and the fetid gum resins are composed of gum resin and a peculiar volatile oil. Assafoetida is an instance of this last group.

RESOLUTION.—The disappearance of inflammation, without the formation of pus.

RESPIRATION.—This process is subordinate to that of digestion, and is the name given to the process by means of which the blood takes in oxygen from the air, and gives out carbonic acid. The first step in the performance of it is a sensation felt in the chest, immediately after expiration, which, if unrelieved, soon amounts to agony, and which excites to acts of inspiration, and is by inspiration quite relieved. This sensation depends upon the presence of venous blood in the capillaries of the lungs, and is communicated to the brain, or rather to the medulla oblongata, by a nerve. When this sensation is felt, an influence is sent through the motor nerves of the muscles concerned in respiration, which causes them to contract.

The result of their contraction is to expand, in all directions, the cavity of the chest. When the chest is so expanded, a vacuum is formed, and the air rushes into it through the windpipe, and parts with its oxygen to the venous blood.

The movement of inspiration is followed by that of expiration. Usually, this act requires little muscular effort, although, in certain morbid conditions, violent expiratory efforts are made. These

movements of expiration and inspiration are made in the human subject about eighteen times in the minute. In a healthy man, about forty cubic inches of air are taken into the chest at each inspiration; and thus about six hundred cubic feet of air are drawn into the lungs every day.

The expired matter is essentially carbonic acid, about forty thousand cubic inches of which are given off from the lungs of an adult in the day. This quantity contains about eleven ounces of carbon, which is thus excreted from the system. But the expiration is not merely an excretive process; for the carbon and oxygen, uniting in the body, keep up the animal heat.

RETINA.—This is the expansion of the optic nerve that forms one of the coats of the eye, and upon which the images of external objects are formed.

RHAMNUS CATHARTICUS, or the **BUCKTHORN**.—This is an indigenous tree, and grows in hedges and thickets. Its fruit, which is black externally, but of a deep red in the inside, is the officinal part of it. Buckthorn berries contain a very active purgative principle, and were formerly much employed as such, particularly by domestic practitioners. They are, however, extremely violent, and now little used. There is an officinal syrup of them, which is occasionally employed.

RHATANY.—This is the root of the *Krameria triandria*, a South American plant, and is an astringent, and well adapted for all the purposes such remedies are required for. It is also employed as a tooth-powder, and is said to be used in the manufacture of fictitious port-wine.

RHEUM.—See 'Rhubarb.'

RHEUMATISM.—There are two kinds of rheumatism, the acute and chronic; both of which, however, are apt to run into one another, and to render it sometimes difficult to pronounce which of the two affections a rheumatic patient may be suffering from.

Rheumatism is a peculiar or specific inflammation of the fibrous tissues, the larger joints and the pericardium being most liable to be attacked. But, unlike common inflammation, rheumatism never ends in either suppuration or gangrene; but when the membranes of the heart are affected, there is the tendency to the deposition of lymph.

In acute rheumatism, there is a strong disposition of the disease to suddenly shift its place from one joint to another, or from one or more joints to an internal organ. The ankles, knees, wrists, and elbows are, perhaps, upon the whole, most frequently attacked. These, or the other joints, are swollen, and very painful; there is much sympathetic fever, and the pulse is remarkably full and bounding; the skin is not, as in most febrile diseases, hot and dry, but covered with an acrid perspiration; and the tongue is coated at its centre, but red at its edges. The fever never becomes typhoid. The disease lasts

about six weeks, many joints, in succession, being attacked, and then, unless internal organs become complicated, gradually abates.

The treatment of acute rheumatism mainly consists in watching and checking the first tendency of its metastasis to some internal organ. But there can be no doubt but that the disease can be rendered less violent, and its course probably checked, by the administration of colchicum. The pain should be rendered less intolerable by administering opiates.

In chronic rheumatism, the pain is not nearly so acute, and there is no fever; and, unlike the acute form, the pain is aggravated by cold, and diminished by heat. The treatment of it consists in warm clothing, warm baths, taking diaphoretics—as Dover's powder, guaiacum, and the like—and perhaps, above all, in administering iodine. Local stimulating applications are also of great utility.

RHUBARB.—This very important drug has been used for a long time. It is the root of more than one species (but not determined) of *rheum*. Six kinds of it are known in the market. The most valuable is commonly called Turkey; but improperly so, for it comes, through Russia, from some part of China. There is also a Batavian, an East Indian, or Chinese; one grown in the Himalayan mountains, and a French and English kind. The two latter, however, should not be used.

Rhubarb contains an odorous principle, a yellow colouring matter, some tannin, and a peculiar principle that possesses purgative properties.

In small doses, rhubarb is a stomachic and astringent tonic; and in larger, a purgative. In both manners, it is very extensively used in the diseases both of adults and children.

RICE.—This is the grain of the *Oryza sativa*. It is the staff of life of many Oriental nations, and is a good deal used in this country. It consists mainly of starch, but it contains also a considerable proportion of oleaginous and albuminous proximate principles, and hence can, unaided by other food, keep up the structure of the body.

RICINUS COMMUNIS—the Castor-Oil Plant, or *Palma Christi*.—This plant has been known from the most ancient times, and is by some believed to be the gourd of the Old Testament. It receives its name, *ricinus*, a tick, on account of the resemblance that its seeds bear to this parasite of the dog. From these seeds a fixed oil is obtained, either by expression or coction, the former plan being much the better. This castor-oil is a thickish fluid, lighter than water, without very much taste, and of a slightly nauseous smell. Unlike the ordinary fixed oils, it is entirely soluble in alcohol. It is much employed as a mild purgative, in all cases where it is of importance not to produce abdominal irritation.

RINGWORM.—This is a variety of *porrigo*, that affects the head, particularly of children, and which

is contagious. It occurs in circular red patches, upon which numerous yellow pustules make their appearance. The fluid from these pustules forms a yellow scab. A good deal of itching accompanies the disorder.

The treatment consists in cleanliness, and, when the disease has become chronic, in the application of stimulating washes. A popular remedy is smearing the surface of the scab with ink.

ROCHELLE SALTS.—This is one of the popular names of the sodio-tartrate of potash, the active ingredient of the Seidlitz powders. It is also called Sal-polyerist. It is a mild purgative.

ROSA CANINA, or the **DOG-ROSE**, is a very common indigenous shrub. The fruits or *hips* of it are very much used in pharmacy. They are preserved with sugar, and the conserve thus made is the usual basis of pills. Mixed with a little dilute sulphuric acid, conserve of roses makes a litmus that is very much employed, particularly in hospitals, in cases of chronic cough.

ROSA CENTIFOLIA—The hundred-leaved Rose, is now very extensively cultivated in gardens in this country. Florists are acquainted with probably more than a hundred kinds, of which, perhaps, the most beautiful is the moss rose. The variety that ought to be grown for medicinal purposes is the cabbage rose. The petals of this are the officinal part, and contain a very fragrant volatile oil (attar or otto of roses), and a slightly laxative principle. A sirup of them is made which is sometimes given to young children; but their main use is to afford rose water, which is very much employed, on account of its agreeable taste and odour, as the basis of mixtures, lotions, and eyewashes.

ROSA GALLICA, or **FRENCH ROSE**, is a native of the south of Europe, but is now naturalized and cultivated in this country. The officinal parts are the petals of the flowers, which contain a little tannin, and a peculiar colouring matter. They are slightly tonic and astringent, but are mainly used as a vehicle for other medicines, a purpose which their beautiful colour well qualifies them for. An infusion of them, with a little sulphuric acid, almost completely covers the nauseous taste of Epsom salts, and also of quinine. A confection of the petals of this rose is also used as a pill basis, and this, when mixed with honey, forms the *mel-rosæ*, a mild astringent, suitable for slight diseases of children, and as a topical application to aphthous mouths, relaxed sore throats, and the like.

ROSE, or **ERYSIPELAS**.—This is also called St. Anthony's Fire. It is a peculiar inflammation of the skin, which has a constitutional origin. The accompanying fever precedes the local affection. The patient feels poorly, shivering, and often drowsy; then rigors come on, the pulse rises, and there is a nausea or vomiting. After these symptoms some part of the face, usually a cheek or an ear, or one side

of the nose, begins to swell and redden, and to feel stiff and burning. This inflammation extends to other parts of the face and scalp, and swelling to a very great extent comes on, and sometimes the inflammation spreads to other parts of the body.

Along with these local symptoms, the general fever often becomes very intense; and in a little it has a tendency to become typhoid.

In favourable cases, the local inflammation gradually disappears, and the fever abates. Sometimes, however, there is suppuration, and in other instances the disease has a fatal termination.

There can be little doubt but that the rose is a contagious disease, and that it often prevails epidemically, and the causes that predispose to typhus—depressing emotions, insufficient food, and the like—powerfully predispose to it.

The treatment of rose depends entirely upon the character of the accompanying fever. If the patient be young and robust, and the fever inflammatory, depletion and an antiphlogistic regimen are necessary. If, however, as is more usually the case, the fever be typhoid, stimulants are necessary. The local application that appears to answer best, is a poultice containing acetate of lead and opium.

ROSEMARY.—The *Rosmarinus officinalis* of botanists. It is an inhabitant of the south of Europe, but is grown in our gardens. Its flowering tops are officinal in all the three pharmacopœias. They have a very strong and peculiar smell, and a bitter aromatic taste, for both of which they are indebted to a peculiar volatile oil that they contain. Taken internally, they are carminative and mildly stimulant, and the oil is one of the best local applications to chilblains. The celebrated Hungary water is essentially a spirituous solution of rosemary, and was formerly much used as a perfume, and as a restorative in fainting, hysteria, &c.

RUBEFIACIENT.—An external application that reddens the skin.

RUE.—This plant was formerly much esteemed, and is now perhaps unjustly neglected. It is a native of the south of Europe, but is commonly grown in the gardens of this country. It is a small undershoot, the leaves and unripe fruit of which are officinal. Rue contains a bitter extractive principle and an essential oil, and has a very strong and peculiar odour and taste. It is a powerful antispasmodic, and used to be much employed in flatulent colic of children, hysteria, &c., and might probably be now used with advantage oftener than it is. Its oil is sometimes applied externally as a counter-irritant.

RUM.—The ardent spirit obtained from the distillation of the fermented solution of sugar.

RUMEX ACETOSA, or the **SORREL**.—The leaves of this plant are officinal. They are agreeably acid, and a decoction of them was formerly used in whey as a drink in febrile complaints.

RUMINANTIA.—That class of animals, the members of which chew their cud.

RYE.—This corn has been cultivated from time immemorial, and still forms the staple food of many nations; but in this country it is almost superseded by wheat and oats. It is very nutritive.

RYE, ERGOT OF.—This is sometimes called spurred rye, and appears to be a disease that occurs in damp weather, and to be owing to the presence of a parasitical fungus. Those who live upon bread made of this spurred rye, are liable to be affected with gangrene of the extremities.

SABINE, or SAVIN.—The savin tree is the *Juniperus savinus*, a native of southern Europe, but which has long been cultivated in our gardens. The officinal parts are the dried tops, which consist of the young branches with their leaves attached. Savin is an acrid poison, and, when applied locally, a powerful irritant. It is little used internally, but is still employed externally, in the form of an ointment, mixed with lard and wax, to dress blistered surfaces, that are meant to be kept open, or converted into perpetual blisters. Still more diluted, it is used as a stimulating ointment to common chronic ulcers. Savin ointment may be known by its peculiar green colour.

SAFFRON.—The stigmata of the *Crocus sativus* have been employed in medicine from time immemorial, and still form an ingredient in several officinal preparations. But its modern use is chiefly as a colouring agent, and the cordial and aromatic properties formerly ascribed to it are now believed to be erroneously so.

SAGE.—The leaves of this plant, like most of the labiate plants, have a warm aromatic taste and smell, and their infusion, or tea, is a domestic remedy in slight dyspeptic cases. Sage is also used as a flavouring ingredient in cookery, and sometimes it is mixed with the curd in making cheese. Sage cheese, however, is now uncommon.

SAGO.—This farinaceous substance is obtained from one or more palm trees. One tree is said to yield as much as six hundred pounds of it. It is almost entirely starch, and is much used in the sick chamber, both in the form of gruel and puddings, as a non-irritating article of food.

SAINT ANTHONY'S FIRE.—An old name for the rose, or erysipelas.

SAINT VITUS' DANCE.—An old name for chorea.

SALADS.—These are uncooked leaves and roots of lettuce, cress, radish, &c., and to those with whom they do not disagree are unquestionably a very proper admixture of diet.

SALIVA.—This fluid is secreted by the three salivary glands, particularly when sapid food is taken into the mouth, and masticated. It is principally composed of water, and its main end is to assist in reducing the food to a pulp. Various medicines, particularly preparations of mercury, have the

power of exciting the salivary glands to secrete an immense quantity of the saliva, and this state is called salivation. See 'Sialogogue.'

SALMON.—This is one of the most nutritious of our fishes, but owing to its oil being diffused throughout its flesh, and not confined to its liver, as in white fish, it is difficult of digestion to dyspeptics. The true salmon, too, when in season, contains a great proportion of oleaginous matter. The salmon-trout, although its flesh possesses a good deal, has less, and hence it is more easily digested.

As is the case with almost all edible fish, the flesh of the salmon after spawning becomes injurious.

SALT.—A salt is a compound of two or more substances, and which is neither decidedly alkaline nor acid.

SALT.—See 'Sodium, Chloride of.'

SALTS.—See 'Epsom Salts.'

SALTPETRE.—See 'Nitre.'

SAMBUCUS NIGRA.—This is the common elder tree, and has been employed in medicine ever since the times of Hippocrates, although it is now more used domestically than prescribed by the physician. The flowers, the ripe berries, and the inner bark, are, however, still officinal. The flowers contain a volatile oil of an agreeable odour, and are employed in the manufacture of elder-flower water, which is used as a vehicle for eye-washes, &c., and as a perfume. They are also used to make the elder-flower ointment of the shops. The berries contain a slightly narcotic principle, and a rot is made from them; but the greatest use that they are put to is to make elder-wine, a very common popular remedy in cases of cold. The inner bark is a hydragogue cathartic, and is sometimes given as such in cases of dropsy.

SAMPHIRE.—This is a good deal used in some parts of the country as a salad and a pickle. It is an indigenous, succulent, umbelliferous plant, that grows on rocks by the sea-side.

SARSAPARILLA is the root of several species of simlax. It contains a large quantity of starch, and is also said to possess a peculiar principle, called simlacin. It is regarded as a valuable tonic and alterative in cachectic states of the system, as chronic skin diseases, chronic affections of the bones, &c. Many practitioners, however, consider its remedial activity to have only an imaginary existence.

SASSAFRAS.—The sassafras tree is a native of Florida. Both its root and bark are occasionally used in medicine, both owing their activity to a volatile oil that they contain, and which oil is a sudorific. Sassafras is generally used in combination with guaiacum or sarsaparilla, in chronic skin diseases, and the like. A hot decoction of it, flavoured with milk and sugar, used to be sold in the streets at daybreak; but the reduction of the

duty on coffee has caused hot coffee to supersede it.

The sassafras nuts, used during the continental war as a substitute for nutmegs, are not the produce of this plant, but of some lauraceous plant of Brazil.

SCAMMONY.—This important drug is the gummy, resinous exudation from the root of the *Convolvulus scammonum*. This plant grows in hedges and bushes, in Greece and the Levant; and its exudation, or gum scammony, is imported from Smyrna. It is a powerful and drastic purgative, and was the one usually employed, when such was necessary, before croton-oil became common. It is, however, still much used in the case of children; and for these patients it possesses the additional qualification of being almost tasteless. Indeed, if mixed up with milk, it has no taste at all.

SCARBOROUGH MINERAL WATER.—The mineral well at Scarborough is a chalybeate, and the proximity to the sea, and the good beach, afford facilities for sea-bathing.

SCARLET FEVER, or SCARLATINA.—This is a contagious febrile disease, attended by a rash and a sore throat, and which usually occurs only once in the lifetime of an individual. It is eminently like the measles, a disease of childhood, but it is a much more dangerous disease than they are. It begins with shivering and debility, headache and nausea, or vomiting, and soreness of throat; and on the second day the rash makes its appearance. This rash commences in minute points, which, however, spread and increase so rapidly, that the whole surface soon becomes uniformly inflamed. The parts usually first affected are the face, neck, and breast. In a mild and favourable case, at the end of three or four days, the eruption begins to fade away, and by the seventh entirely disappears, the cuticle shelling off. At the same time the fever abates, and the sore throat gets better. The tongue has a very peculiar appearance when the disease is developed, being extremely red, especially at the edges.

Unfortunately, scarlet fever is not always so mild, or so disposed to a favourable termination, as just described. Sometimes, from the very beginning, the fever is typhoid; and in such cases the eruption is livid and partial, and there is great tendency to sinking from the very commencement of the disease. At other times, the throat affection is dangerous, and ulceration and gangrene come on.

Scarlet fever, besides being a dangerous disease in itself, is likewise very apt to be followed by very injurious sequelæ. Children, who have recovered from it, are extremely liable to be attacked with every form of scrofula; and, which is, at any rate, more rapidly fatal, acute dropsy often comes on towards the close of the disease.

The treatment of a mild case of scarlet fever

simply consists in confinement to the house, and the observance of the antiphlogistic regimen. In severer cases of it, in which the fever is high, and the headache severe, leeching and purgatives are indicated; and when the fever is typhoid, stimulants. The throat affection may be somewhat relieved by gargles.

It has been asserted that belladonna is a prophylactic against scarlet fever.

SCIATICA is an affection of the sciatic nerve, sometimes of a rheumatic, sometimes of a neuralgic character, and very often a compound of the two. According to its nature, it will be relieved by colchicum, iodine, steel, &c. See 'Rheumatism' and 'Neuralgia.'

SCIRRHUS.—See 'Cancer.'

SCROFULOUS DIATHESIS.—Those who are most disposed to become affected with tubercular or scrofulous diseases, may be usually noticed, when children, to have large heads, narrow chests, pale faces, flabby muscles, and a feeble circulation. Their intellect is usually precociously developed, and their disposition is often very susceptible. Very often there is chronic *lippitudo*, which produces what is called blear-eyedness; and, from a somewhat similar cause, the upper lip is frequently swollen. Whenever such appearances are witnessed in a child, we must always be prepared for its taking mesenteric disease or consumption, or having ulceration of glands, or some of the other many forms of scrofula.

The scrofulous diathesis is unquestionably hereditary, but the latent poison is usually excited into action by cold, damp, and insufficient food, or, indeed, anything that debilitates the frame.

Any person of a scrofulous diathesis should be carefully protected from these exciting causes.

SCURVY, SEA.—This is, strictly speaking, a hæmorrhage. Its first appearance is indicated by small round spots of blood, that appear under the skin, generally of the legs first of all. No pain attends these spots, and pressure upon them does not efface the colour; and there is generally a great tendency to bleeding from the gums, particularly upon the slightest pressure being made upon these parts. In aggravated cases, this tendency to hæmorrhage seems to prevail in internal organs, and to sometimes produce fatal results. On land, such extreme cases rarely occur; but at sea they occasionally do: and formerly they were so very frequent as often to destroy whole ships' crews.

The cause of scurvy is the privation, for a considerable time, of fresh succulent vegetables, and its remedy consists in the administration of such. When, as at sea, it is not convenient to procure these, lemon juice is found to be an effectual preventive, if daily administered.

SEASONS, INFLUENCE OF.—The season of the year has a very powerful influence upon the public

health. Colds and pectoral complaints are most common during winter and spring, and abdominal affections during the summer and autumnal months. The cerebral diseases of the aged, too, are very much aggravated by cold weather; and from this cause, and from the prevalence of the pectoral complaints, more old people die during winter than summer. Very young children, too, have a much higher mortality during winter than during summer.

SEA-ONION.—See 'Squill.'

SECALE CEREALE.—The botanical name for rye.

SEDATIVES.—Sedatives and narcotics are often confounded together; but, properly speaking, a sedative is a medicine, such as foxglove and tobacco, which has a very powerful depressing effect upon the circulation. These drugs, when swallowed in large doses, give rise to extreme nausea, vomiting, great feebleness, and irregularity of pulse, and, if continued, to fainting and insensibility. Tobacco, in particular, causes extreme relaxation of the muscles.

SEIDLITZ POWDERS.—These agreeable and useful purgative preparations have no resemblance to Seidlitz Water. They were first prescribed by one of the name of Sedlitz, and by some mistake came to be called, as they now universally are, Seidlitz. They consist of two drachms of tartarized soda, and two scruples of carbonate of soda, wrapped up in a blue paper, and thirty grains of powdered tartaric acid, contained in another and white paper. The contents of two papers are dissolved in half a tumbler of water, and the two solutions mixed together, and the whole drunk in a state of effervescence. They are a very safe and mild aperient. Their efficacy is much increased if the water be lukewarm.

SEIDLITZ WATER.—This mineral contains a considerable quantity of sulphate of magnesia, and hence is a purgative.

SEIGNELLE SALT.—Sodio-tartrate of potash, or Rochelle salts.

SELTZER WATER.—This is the most famous of the alkaline waters, and is highly charged with carbonic acid. It may be used medicinally as an antacid, but its chief consumption is as a drink, especially when mixed with wine. The use of alkaline drinks at dinner-time, or soon after, is, however, improper; for they neutralize the natural acid of the stomach, which is essential to digestion.

SEMOLINA.—The original semolina was the ground flour, or the seed, of a poa; and another variety seems to have been prepared from wheat. Both these kinds, containing as they do, besides saccharine, albuminous, proximate principles, are very nutritious. But the semolina commonly sold in the shops is merely a form of starch, obtained probably from potatoes.

SENEGA, or RATTLESNAKE ROOT.—This is an inhabitant of the United States of America, and

was introduced into medicine a century and a half ago, as a remedy against the bite of venomous reptiles. It is certainly a diaphoretic and expectorant, and although not now believed to possess any power of curing the bite of the rattle or any other snake, is used in chronic catarrh and asthma. In these diseases, in debilitated constitutions, it is often useful, combined with ammonia.

SENNA.—This important drug consists of the leaves of several varieties of cassia. It is imported from the Mediterranean and the East Indies. Senna leaves have a peculiar and rather agreeable smell, and a bitter and nauseous taste. They contain a volatile oil, and a peculiar uncrystallizable principle, upon which their purgative properties seem to depend. Of all the drastic purgatives, senna is the mildest. "Unlike," says Pereira, "scammony, gamboge, jalap, and most other drastics, it does not rank among poisons, even when given in large doses. It is distinguished from the saline purgatives by its stronger and more instant operation, by the heat, griping, and increased frequency of pulse, which attend its purgative action. From rhubarb, it differs in being more powerful and irritant in its operation, in being nearly or quite devoid of any tonic operation. It acts more powerfully and speedily than aloes, and in a less marked manner, upon the large intestines. In its operation, it appears to rank between aloes and jalap."

Senna is very much employed in all diseases that require an active and certain purgative, and when mixed with salts, it constitutes the "black draught," which is the usual ordinary purgative of the hospitals. The various pharmaceutical preparations of senna are given under their respective heads.

SEPIA, or CUTTLE-FISH.—Cuttle-fish bone is cast, in considerable quantities, upon the sea-shore, and, when reduced to powder, forms a dentifrice. It is merely carbonate of lime, or chalk, and possesses no advantage over other forms of this substance.

SERPENTARY, or SNAKEROOT.—This is the root of an *Aristolochia*, and was formerly thought to possess the power of curing the bites of the rattlesnake and of a mad dog. These properties are, of course, imaginary. It contains, however, a bitter principle and a volatile oil, and is a tonic and stimulant. It is said to have sometimes cured ague, and was formerly given as a stimulant in typhoid fevers. Its properties seem to resemble those of camphor, but they are weaker.

SESAME.—This is an Indian annual, the seeds of which yield *teal oil*, which is sometimes sold as almond oil. The seeds are also used in India as food.

SEVUM.—Mutton suet, or the fat around the kidneys of the sheep. It is used as a basis for ointments and plasters, when it is wished to make them firm, it having a much greater consistence than

hogs'-lard, which is more usually employed for the purpose.

SHAMPOOING.—This is an Indian process, that has been imported into this country. It consists in putting a person into a vapour-bath, and then rubbing him, and bending, extending, and pressing his muscles. It is probably useful in chronic rheumatism.

SHELL-FISH.—These are not fishes at all. The principal animals so named that are used as food are lobsters, crabs, mussels, and oysters. The two first are, from the quantity of oil that they contain, difficult of digestion; the two last, which are molluscos animals, are, except occasionally, when they become poisonous, digestible enough.

SHERRY.—See 'Wine.'

SHINGLES.—See 'Herpes.'

SHOWER BATH.—The shower bath is the mildest form of using the affusion of cold water. It is very much and very usefully employed in almost all chronic diseases, in which it acts as a tonic. The daily use of the shower-bath is particularly useful in chronic nervous affections, and also in most chronic diseases of the digestive organs.

SIALOGOGUES.—These are medicines that excite the salivary discharge, and are of two kinds, local and remote. The former, as ginger, horse-radish, or betel, are chewed, and immediately produce their effect. These are not now, at least in this country, much used, but they are, perhaps, useful as counter-irritants in toothache, earache, &c. The remote sialogogues are those which, when taken into the system, produce salivation; and of these, mercury is the most important. But it is not the salivation that does good—the salivation indicates that the mercury is affecting the system.

SICKNESS.—See 'Vomiting.'

SILVER.—This metal is the Luna of the alchemists, and is one of the metals that has been known from the most remote period of historical antiquity. It is found in various states—sometimes pure, and sometimes alloyed with other metals, and also in ores. The native silver and the sulphuret are, however, the most frequent forms in which it occurs. Pure silver has no action upon the animal economy, but it is mechanically employed by the dentist for stuffing teeth, a purpose for which it is not well suited, inasmuch as it (or rather its amalgam, for it is always combined with some other metal) turns black when it meets with sulphuretted hydrogen.

The nitrate of silver is used medicinally, in very small and long-continued doses, as a tonic, in cases of chronic diseases of the nervous system, particularly in epilepsy. It has, however, the very great disadvantage of being apt to make the skin assume a blue colour, and its administration is now considered pretty generally to be objectionable.

SINAPIS.—See 'Mustard.'

SINAPISM.—A mustard plaster.

SIRUP.—Simple sirup is made by dissolving ten pounds of sugar in three pints of water. Several compound sirups are ordered by the pharmacopœia, and are extensively used, principally as adjuncts in prescribing. The following are the most important:—

Sirup of Althea, or Marsh Mallow.—Take of

Althea root, fresh }
and sliced, } Eight ounces.

Pure sugar, Two pounds and a half.

Water, Four pints.

Boil down the water, with the root, to one-half, and strain. Set aside for twenty-four hours, that the impurities may subside, then pour off the liquor, add the sugar, and boil to a proper consistence. A demulcent pectoral, given in tickling coughs, chronic catarrhs, &c.

Sirup of Oranges.—Take of

Fresh bitter orange peel, .. Two ounces and a half.

Boiling water, A pint.

Sugar, Three pounds.

Macerate the peel in the water for twelve hours, strain, and add the sugar. The mixture must then be reduced to a proper consistence with as little heat as possible, in order to avoid driving off the volatile oil. This is a tonic and stomachic, and much used as an addition to tonic mixtures.

Sirup of Lemons.—Take of

Lemon juice, strained, A pint.

Sugar, Two pounds and a half.

Dissolve the sugar in the juice by the aid of a gentle heat, set aside for twenty-four hours, remove the scum, and decant the sirup from the dregs. This is a pleasant addition to refrigerant drinks in febrile and inflammatory complaints.

Sirup of Poppies.—Take of

Poppy-heads, Three pounds.

Sugar, Five pounds.

Boiling water, Five gallons.

Boil down the capsules in water to two gallons, and strongly express the liquor while hot. Boil down the strained liquor to four pints, add the sugar, and dissolve it. This is narcotic, sedative, and anodyne, and is the form of opium usually fixed upon for children. It requires, however, to be administered with caution, and never unless ordered by a medical man.

Sirup of Red Poppies, or Sirup of Rhaados.—

Take of

Petals of red poppy, ... A pound.

Boiling water, A pint.

Sugar, Two pounds and a half.

Add the petals gradually to the water heated in a water-bath, then macerate for twelve hours, express, add the sugar, and dissolve it. This is not narcotic at all, and is only used as a colouring ingredient.

Sirup of Senna.—Take of

Senna,.....Two ounces and a half.

Fennel, bruised, ...Ten drachms.

Manna,.....Three ounces.

Sugar,Fifteen ounces.

Boiling water,.....A pint.

Macerate the senna and fennel with a gentle heat in the water for an hour. Mix the manna and sugar with the strained liquid, and boil down to a proper consistence. A very excellent child's purgative.

Sirup of Ginger.—Take of

Ginger, sliced,.....Two ounces and a half.

Boiling water,.....A pint.

Sugar,.....Two pounds and a half.

Macerate the ginger in the water for four hours, and strain; then add the sugar, and dissolve it. This is often added to bitter infusions.

SKIN.—The skin is made up of two layers, called the *dermis*, or true skin; and the *epidermis*, or scarf-skin, or cuticle. The former is a firm and tough membrane, very elastic, and of a pretty complex structure. It consists of a number of fibres, interlacing one another in all directions, and permeated by a vast number of blood-vessels, lymphatics, and nerves, and also by ducts of its perspiratory glands. Its internal surface rests, at least in a normal state, upon fat. Its external one is surmounted by a number of papillæ, or little elevations, in the centre of each of which there is the extremity of a nerve. The relative number of these papillæ varies very much in different parts of the body, being much more numerous on the tips of the fingers and the hands than in any other part of the body. These papillæ are the organs of touch, and the sensibility of any part depends upon the number of them that it is supplied with.

The office of the epidermis, which is almost simply condensed albumen, is to protect the true skin from impressions of a too acute nature. It has no nerves or bloodvessels, and can scarcely be regarded as a vitalized structure at all. By pressure it becomes very much thickened, as is witnessed on the soles of the feet, the hands of labourers, &c.

SLEEP.—The nervous system needs a time of repose, and to this repose the name of sleep is given. Sleep is characterized by the suspension of all voluntary power over the trains of thought and of voluntary motions. All the sensations, too, are blunted, although not quite obscured. The circulation during sleep is more languid, and the perspiration and secretion of carbonic acid are diminished in quantity. It is for these reasons that the body during sleep is much more disposed to be injuriously affected by cold.

SLEEP-WALKING.—See 'Somnambulism.'

SMALL-POX, or VARIOLA.—This dreadful disease commences with rigors, alternating with heats, a quick and hard pulse, headache, nausea, and vomiting. There is usually, too, pain in the back.

These symptoms continue till the third day, when an eruption makes its appearance, generally first upon the face, then on the neck, wrists, and trunk, and lastly on the lower extremities. This eruption is at first composed of pimples, which gradually ripen into pustules, the suppuration being completed on the eighth day. Then they begin to break, and crusts and scabs form. There is sometimes, however, a variation of a day or two in these particulars.

When the pustules are numerous, they run together; and when this is the case, the disease is named confluent small-pox. When they are quite distinct, the affection is said to be discreet small-pox; the reason being that non-confluent small-pox is not at all a fatal disease, whereas the confluent kind is a very mortal and dangerous one indeed.

As the pimples are gradually progressing into pustules, there is much swelling, particularly of the face; so much, indeed, as often to close the eyelids, and completely change the appearance of the affected man. After the matter has formed, and a scab has appeared, the whole gradually dries up, and the skin underneath either assumes a peculiar red appearance, or there is an indelible depressed scar left. When this latter occurs, the person is said to be pock-marked. In non-confluent cases, however, no permanent injury may be done to the face. The scabs on the extremities form and fall off a day or two later than those upon the face.

In the discreet form of the disease, the fever generally disappears with the breaking out of the rash, but returns again on the seventh or eighth day, but only continues for a day or two. This is technically named, the fever of maturation.

The confluent form of the affection seems almost a different disease from discreet small-pox. The fever at the beginning is far more violent, the sickness greater, and the pain in the head and back much more intense. The eruption, too, comes out earlier, and is much more numerous. When it has so come out, the fever may abate a little, but by no means in so marked a manner as in the discreet kind. But, perhaps, the most remarkable peculiarity of the confluent kind is that, on the eleventh day of the disease, a typhoid fever is set up, which unfortunately, in too many cases, is fatal.

Both forms of small-pox are accompanied by sore throat, and in the confluent kind there is salivation. This soreness of the throat is dependent upon the presence of pustules upon the mucous membrane. Sometimes, too, pustules form upon the conjunctiva of the eye, and these may be so deep as to allow the humours of that organ to escape, and thus produce blindness. Occasionally, the swelling about the throat is so great as to cause suffocation. Too often the fever, in confluent small-pox, becomes very typhoid, and the pustules are bloody, and hæmorrhages occur from various parts of the body, and such cases rarely, or never, get better.

Small-pox, like other contagious exanthematous fevers, prevails epidemically, although, of course, isolated cases are of frequent occurrence. It is communicated by contact, or near proximity to a diseased person, and also by the direct introduction of the matter of a pustule into the blood. Like other exanthematous fevers, it only occurs once in a lifetime. Advantage was taken of this to artificially communicate the disease at a time when the person was in good health, and hence likely to have the disease in a mild form. (See 'Inoculation.') But it is now known that a very trifling disease, produced by the introduction of matter from a vesicle on the udder of a cow, gives a complete protection—(see 'Vaccination')—and now inoculation is never practised.

The treatment of small-pox was formerly conducted on very erroneous principles. It was thought necessary to attempt to force out the morbid matter by keeping the patient hot, and by administering wine and cordials. This greatly aggravated all the symptoms; and ever since the time of Sydenham, a perfectly opposite plan has been very successfully followed. At the beginning, when the fever is high, a cool regimen is observed, and saline purgatives given. Of course, when the fever becomes typhoid, stimulants are indicated. The irritation of the pustules may be relieved by smearing them with a liniment, composed of olive oil and lime water.

SMELLING SALT.—This is the sesquicarbonate of ammonia, mixed with some aromatic oil, usually oil of lavender, or of bergamot. Its use in fainting fits, hysteria, &c., is well known.

SIMLAX.—See 'Sarsaparilla.'

SNEEZING.—Sneezing is a common symptom in catarrhal affections. When it occurs along with chronic cough, we are entitled to hope that the disease is not tubercular consumption. Sneezing sometimes constitutes a nervous or hysterical disease, and a person so affected will sometimes go on sneezing for a long time.

SOAP is an artificial product, made by mixing an alkali with fat or resin. A variety of soap, too, is made by the union of oxide of lead or lime with oily matter.

There are several varieties of soda soap. One kind is made by boiling olive oil with caustic soda. One form of this constitutes common white soap. Sometimes a little sulphate and red oxide of iron are added, which communicate to it a mottled appearance. Another kind of soda soap is made by boiling some animal fat with caustic soda, a very good example of which is the Windsor soap; and the common yellow soap of the shops is composed of resin and soda. All the soda soaps are hard.

Those made with potash constitute soft soaps; and in commerce only one kind is found, that made by boiling together potash, tallow, and fish oil.

Soap is used in medicine, both internally and externally. Swallowed, it is a purgative and antacid, and is useful in pharmacy in making up pills, &c. Externally it is, on account of its lubricating properties, a very convenient basis or adjunct to liniments.

SODA, CARBONATE OF.—The old name of this compound is mineral alkali. It is found in many parts of the world, but is, for medicinal and commercial purposes, always procured artificially. It is prepared in a variety of manners, but, perhaps, the most interesting of these is its procurement from kelp, although, in practice, little carbonate of soda is thus made. Carbonate of soda is an antacid, and is used occasionally as such.

SODA, BICARBONATE OF.—The simplest mode of obtaining this is by passing a stream of carbonic acid through some of the previously described carbonate. It is the substance commonly called in the shops the carbonate, and is very much used, as an antacid, in dyspepsia, and in the manufacture of sodaic effervescing powders.

SODA, CHLORIDE OF, or COMMON SALT.—The proper name of this is chloride of sodium, but it may here be described along with the other compounds of soda. It occurs in nature most extensively, sea water containing between two and three per cent. of it. It is also found in many mineral springs, and also as a mineral in large beds. In this country, it is obtained from the evaporation of brine springs; but in other places, as used to be the custom here, it is procured from sea water. Two kinds are known in commerce, the small grained or basket salt, and the coarser or bay salt.

Common salt seems to be a necessary part of the food, or a necessary seasoning to the food of man. It is said that the individuals who do not habitually use it, are infested with intestinal worms. According to a statement usually made in the books, an old plan of execution in Holland was to confine a prisoner, and feed him upon bread (and bread alone) which contained no salt, and that in the moist climate of the Low Countries the effect was horrible.

As a medicine, common salt is little used internally. In large quantities, it is an emetic, and when sulphate of zinc cannot be procured, may be employed in cases of narcotic poisoning. But it is externally that, in a therapeutical manner, it is principally used. Bathing in sea water (which differs from bathing in ordinary water mainly in the sea containing salt) is one of the most commonly practised parts of a tonic regimen. Artificial sea water may be made by adding one part of salt to forty of common water.

Another substance sold in the shops under the name of Chloride of Soda is, Labarraque's soda disinfecting liquor. It is now used as a disinfectant, to destroy putrid miasmata, and also in skin diseases.

SODA, SULPHATE OF.—See 'Glauber Salts.'

SODA, TARTARIZED.—This is a compound of tartrate of soda and tartrate of potash. It is the active ingredient in Seidlitz powders.

SODA WATER.—Properly prepared soda water is a solution of bicarbonate of soda, charged with carbonic acid, but a great deal of what is sold has no soda in it, but is composed only of carbonic acid gas and water. Hence, when soda water is given as an antacid, it is prudent to add a little of the alkali.

SODIUM.—The metallic base of soda.

SOLANUM DULCAMARA.—This is an indigenous plant, the stems or twigs of which are officinal. These stems are said to be diaphoretic, and are used sometimes in chronic skin diseases, chronic rheumatism, and the like.

SOLANUM TUBEROSUM.—The potato plant.

SOLOMON'S SEAL.—This is the rhizome of a *convallaria*, and is a popular application to black eyes, with a view of removing the discolourment.

SOLUTION.—An officinal solution is something dissolved in water. The following are the most important of them.

Solution of Diacetate of Lead.—Take of

Acetate of lead,.....Two pounds and three ounces.

Oxide of lead,One pound and four ounces.

Water,.....Six pints.

Boil together, and stir. When cold, add as much distilled water as will make it up to six pints.

Very much diluted with water, this is very largely employed as an evaporating lotion. About two tea-spoonfuls of it in a quart of water are about the right proportion.

Solution of Arsenious Acid, or Fowler's Solution.

Arsenious acid,.....} Of each eighty
Carbonate of potash,} grains.

Compound tincture of lavender,...Five drachms.

Water,Twenty ounces.

Mix. This very poisonous preparation is the usual form in which arsenious acid is administered.

SOPORIFICS.—Medicines that produce sopor; or, in other words, narcotics.

SORREL.—The leaves of the *Rumex acclosa* are officinal. They contain tartaric acid, and hence form a whey, that may be found agreeable in febrile and inflammatory complaints.

SPANISH FLIES.—See 'Cantharis.'

SPANISH JUICE.—See 'Liquorice.'

SPARTIUM SCOPARIUM.—(See Plate XXI.)

The broom is a common indigenous plant, abounding in dry hills and bushy places. The tops are the officinal part. These have a bitter and nauseous taste, and a peculiar odour upon being bruised. They are sometimes employed as winter food for sheep, but upon man they have a very powerful diuretic action, which they probably owe to a volatile oil that they contain. There is, perhaps, no remedy

so active in chronic dropsy as an infusion of broom tops.

SPASM.—This is a perversion of the power of voluntary muscular contraction. Without willing it, some muscle is violently and irregularly drawn up and contracted. Common cramp is a very familiar illustration of a spasm.

Spasm may depend upon either irregular action of the muscle itself, or it may be caused by irritation of the nerves supplying the muscles. And this irritation may be either some slight and temporary derangement, or it may arise from structural disease. Hence spasm, as a symptom, is sometimes of very little consequence, and at others is a most alarming and dangerous one.

SPEARMINT.—See 'Mentha Viridis.'

SPERMACETI.—This is the cetine found in the nose and head of the great-headed cachetot, or spermaceti whale. The substance first extracted is a mixture of spermaceti and sperm oil, but the former is obtained separately by filtration through hair bags. When pure, it is quite white, and free from all odour and taste. It is emollient and demulcent, and was formerly employed in dysentery, pulmonary affections, &c.; but its use is now confined to making cerates and ointments for dressing blisters and excoriated surfaces.

SPINACIA OLERACEA, or SPINACH.—Independently of its agreeable and sapid flavour, this vegetable is useful on account of its possessing laxative properties.

SPIRIT.—A spirit, in pharmacy, is a solution of some decimal substance in alcohol. A great many of these are officinal. The following are the most important:—

Spirit of Nitric Ether.—The preparation of this is too complicated to be here given. This spirit is the sweet spirit of nitre of the shops, and is a very valuable refrigerant, diuretic, diaphoretic, and carminative.

Spirit of Ammonia.—This is a solution of carbonate of ammonia in spirit, and is used internally in hysteria, colic, &c., as a stimulant and antispasmodic. Externally, it is employed as a stimulating liniment.

Aromatic Spirit of Ammonia.—This is the above flavoured with cinnamon, cloves, and lemon peel. It is well known by the name of *sal volatile*, and is very much used in hysteria, flatulence, and similar affections.

Spirit of Anise.—Take of

Anise, bruised,.....Ten ounces.

Proof spirit,A gallon.

Water,Two pints.

Mix, and let a gallon distil. This is an imitation of the liquor called *crème d'anise*, and is used to relieve flatulence and colicky pains.

*Spirit of Horse-Radish (Armoracia).—*Take of
Horse-radish, bruised, } Of each twenty ounces.
Orange peel, dried, }
Nutmegs, bruised, Five drachms.
Proof spirit, A gallon.
Water, Two pints.

Mix, and distil a gallon. This is used as an adjunct to diuretic infusions.

*Spirit of Caraway.—*Take of

Caraway, bruised, Twenty-two ounces,
Proof spirit, A gallon.
Water, Two pints.

Mix, and distil a gallon. This is a powerful aromatic and carminative, and, sweetened with sugar, forms a favourite German liquor.

*Spirit of Cinnamon.—*Take of

Oil of cinnamon, Two drachms.
Spirit, A gallon.
Water, A pint.

Mix, and distil a gallon. An aromatic, much used as an adjunct to mixtures.

*Compound Spirit of Juniper.—*Take of

Juniper berries, bruised, Fifteen ounces.
Caraway, bruised, } Of each two ounces.
Fennel, do., }
Proof spirit, A gallon.
Water, Two pints.

Mix, and distil a gallon. This is a powerful diuretic, and is meant to be an officinal substitution for gin and hollands.

*Compound Spirit of Lavender.—*Take of

Spirit of lavender,* A pint and a half.
Spirit of rosemary, Half a pint.
Cinnamon, bruised, Two drachms and a half.
Nutmeg, bruised, Two drachms and a half.
Red sandalwood raspings, Five drachms.

Macerate for fourteen days, and strain. This preparation is popularly known as lavender drops, and is much used mixed with water, or dropped upon sugar, to relieve flatulence and pain in the stomach.

*Spirit of Peppermint.—*Take of

Oil of peppermint, Three drachms.
Proof spirit, A gallon.
Water, A pint.

Mix, and distil a gallon. Carminative and stimulant spirits of the other mints are made in a similar manner.

*Spirit of Rosemary.—*Take of

Oil of rosemary, Two drachms.
Rectified spirit, A gallon.
Water, A pint.

Mix, and distil a gallon. This is used principally to communicate an agreeable smell to tenements.

* Made by distilling a spirituous infusion of fresh lavender.

SPLEEN.—This large organ is situated behind the stomach. Its office is not well known, but most probably it serves as a reservoir for a portion of the blood when digestion is not going on, and when, by consequence, there is little congestion of the mucous membrane of the intestines. It is particularly liable to become enlarged during intermittent fever, and to remain so long after the fever has been cured. The proper treatment for this enlarged spleen seems to be purgatives and iodine.

The spleen is also occasionally liable to become the seat of tubercular and other deposits. But these cannot be diagnosed during life, and, therefore, cannot be treated.

SPONGE.—This very simple poripherous animal is found in masses, attached to sea rocks in the Red and Mediterranean Seas. It is removed from these by divers, and its flesh, or gelatinous matter, squeezed out. The skeleton that is left constitutes the common sponge of commerce. It contains, among several other ingredients, a little iodine, and at one time burnt sponge was administered in bronchocele and scrofulous swellings. Iodine is now, however, universally substituted.

SPRUCE.—This is obtained by boiling the young tops of some coniferous plant (in America, the *Abies nigra* is selected), and concentrating the decoction by evaporation. It is then a thick liquid, with a bitterish, astringent taste. Mixed with a solution of sugar, it makes spruce beer, which is considered an antiscorbutic.

SQUAME.—That class of skin diseases characterized by scabs.

SQUILL.—The bulb of the sea-onion, or squill, has been used in medicine for a long time. The plant grows wild on the shores of the Mediterranean, and the bulbs are imported to this country from Malta. They contain a peculiar principle, called *scillitine*. In large doses, squills produce nausea and vomiting; and in smaller, they are a very certain diuretic. They are used as a diuretic in dropsy, and as an expectorant in chronic pulmonary affections.

STARCH.—Wheat starch is procured by steeping wheat flour, until it undergoes the acetous fermentation. The acid liquor is then passed through a sieve, and the starch collected. Starch is now, however, extensively obtained from potatoes.

Starch is used in medicine as an emollient and demulcent, and as a vehicle for other medicines. In pharmacy, it is employed to envelop pills.

STAVESACRE.—See 'Delphinium.'

STERNUTATORY.—A medicine that, when applied to the nose, causes sneezing. Such remedies are now very seldom employed.

STIMULANTS.—Remedies that increase the force of the circulation, and the strength of the nervous system.

STORAX.—This is the balsamic exudation of

Styrax officinale, and is imported to this country from the Levant, Palestine, and Greece. It contains a volatile oil, a resin, and benzoin, and is a stimulating expectorant, and may be used in chronic pulmonary affections. The storax pills of the pharmacopœia are, in fact, opium pills, and are so called to enable the practitioner to prescribe opium without the patient knowing it.

STRYCHNIA.—This fearfully energetic poison is the alkaloid of the *Strychnos nux-vomica*, or poison-nut tree. This tree is a native of Coromandel and other parts of India. Both the seeds and the alkaloid strychnia obtained from them, possess the most remarkable power of producing contractions of the muscles; indeed, to such an extent, that even small doses may induce fatal tetanus. Hence, when very carefully watched, they may be useful in cases of chronic paralysis, and are in such cases administered.

STURGEON.—The sturgeon is the fish that yields us isinglass.—See 'Isinglass.'

SUDORIFICS.—Medicines that induce perspiration.

SUET.—The fat of the kidneys of the sheep is used in pharmacy as a basis for ointments, cerates, and some plasters.—See 'Sevum.'

SUGAR.—Sugar is said to have been manufactured from the earliest antiquity in China, and cane-sugar was certainly known, but only as a luxury of rare occurrence, to the Greeks and Romans. It is since the discovery and settlement of the West Indian islands, however, that cane-sugar has become so great an article of food among European nations. Still more recently, on the Continent, sugar extracted from the beet-root has become extensively used; and in North America, sugar obtained from the sugar-maple is the principal kind consumed. All these sugars are, in chemical constitution and in their actions, analogous.

Common sugar, when pure, is white, and without odour, and possesses a remarkably sweet taste. Indeed, of all substances, sugar is the sweetest. If dissolved in water and slowly evaporated, it crystallizes, and forms sugar-candy. Moderately heated, it melts, and becomes barley-sugar; but if the heat be carried beyond a certain temperature, it is decomposed, and converted into a bitter, brown mass, called caramel.

Sugar occurs in the shops in two forms—raw and refined. Raw, or soft sugar, contains a great many impurities, which are separated by means of albumen. When this is done, a quantity of refined sugar and of molasses, or treacle, is left behind.

Sugar is a valuable nutritive principle, and is, moreover, the source from which we obtain all our fermented liquors, beers, or wines. Medicinally, it is a demulcent; but it is in pharmacy that it is mainly employed by the practitioner. It is a very powerful preservative of all animal and vegetable substances; and it likewise serves to give flavour, bulk, form, and consistence, to an immense variety

of therapeutical remedies. Caramel is a good deal used as a colouring agent.

SULPHUR.—This element has been known from the most remote antiquity, and is probably one of the earliest of the therapeutical remedies. It is an abundant product of volcanoes, and the greater part by far of our supply of it is obtained from Sicily. A certain portion, however, is procured from the sublimation of metallic sulphurets. In commerce, it is sold in rolls, or sticks. These are purified by sublimation, and the sulphur is then obtained in a powder, usually known by the name of flowers of sulphur.

At common temperatures, sulphur is a brittle, yellowish-green solid, with no smell and little taste. It is fusible and combustible, burning with a blue flame. Administered in small doses, it acts as a purgative and diaphoretic. It is used as a purgative in intestinal affections and in chronic skin diseases, and sometimes, also, in chronic pulmonary affections. Applied externally, it is a moderate stimulant, but is principally remarkable for its power of killing the itch insect. Hence, inunction with sulphur ointment is a very common mode of curing the itch.

SULPHUR, MILK OF.—When sulphur is boiled with lime-water, a precipitate is thrown down, which is sometimes stated to be a hydrate of sulphur. Its medicinal properties do not differ from those of sulphur.

SULPHURIC ACID, or OIL OF VITRIOL.—This is very important, and is manufactured by mixing together sulphurous and nitrous acids, upon which the latter parts with a portion of its oxygen. Properly speaking, it is a solid; but its affinity for water is so great, that even the strongest kind sold in the shops contains one equivalent of it, and is a fluid. This is a colourless, transparent, highly acid liquor, and it has a most intense acid reaction.

In its concentrated form, sulphuric acid is a most deadly poison; but when properly diluted, it becomes a valuable therapeutical agent. It acts as a tonic and refrigerant, and promotes the appetite, checks perspiration, and allays thirst. It is found particularly useful in hectic fever. In many cases, too, it relieves acidity in the stomach.

SUMACH.—This is the leaf of the *Rhus toxicodendron*, a plant that inhabits the United States of America. It is said to have some action upon the nervous system, that enables it to restore sensation and motion in cases of chronic paralysis.

SUPPURATION.—That stage of inflammation in which pus is secreted.

SYNCOPE.—Stoppage of the heart's action. A familiar form of it is a common faint. This, if it continue long, induces death. A great many diseases tend to produce death in the way of syncope, and the treatment of such essentially consists in the administration of tonics and stimulants.

TAMARINDS.—Tamarinds are imported from the West and East Indies, both raw and preserved. Tamarind *pods* are from three to six inches long, and are composed of a brittle external shell, within which is the pleasantly acidulous and sweet pulp. The preserved tamarinds have not the shell. The pulp is the officinal part, and contains free citric and tartaric acids, and bitartrate of potash. It allays thirst, and in large doses is purgative. Hence it is used in febrile diseases, and as an adjunct to purgative preparations. It is sometimes boiled with milk, to make tamarind whey.

TANNIN.—This substance is contained in a great many vegetables. It is a non-crystalline white or yellowish solid substance, of an intensely astringent taste, and is a very powerful astringent medicine when administered internally. It is used in hæmorrhages, profuse mucous discharges, and the like.

TANSY.—This is an indigenous herb, and is also cultivated in our gardens for culinary and medicinal purposes. All parts of it have a peculiar odour, and a strong aromatic, bitter taste. It contains a volatile oil, to which it owes its properties. It is an aromatic tonic, and its infusion, or tea, has been recommended in dyspepsia, ague, and gout.

TAPIOCA.—Tapioca is the *fecula*, or starch, of the root of the *Jatropha manihot*, a Brazilian tree. The root, besides starch, contains a poisonous principle, which is destroyed by heat and fermentation; and the starch is perfectly wholesome, and free from all stimulating properties. Hence it forms a proper article of food for sick and convalescent people.

TAR.—This resin is extracted from fir-wood by means of heat. It is a stimulant, and was once in great repute as a remedy for almost all diseases. It is now only used externally, as an application to skin diseases.

TARTAR.—This is bitartrate of potash, and is contained in grape juice. Not being very soluble in wine, when the juice has been fermented, it is gradually deposited on the sides of wine casks. It is a refrigerant, a diuretic, and purgative. It is used to make a cooling drink (imperial), and combined with jalap, in dropsical affections.

TARTARIC ACID.—This is obtained from tartar by a pretty complex chemical process. It is a refrigerant, but is principally used to form, with an alkaline, cheap effervescing powders.

TEA.—This very extensively used beverage has been lately stated by Liebig to owe its peculiar properties to a nitrogenous proximate principle—theine, which it contains, and which, in persons of sedentary habits, may make up for a deficient secretion of bile. Notwithstanding, however, the very common and great use of tea, its action is by no means well understood.

TETANUS.—The disease called tetanus, or, popularly, lock-jaw, is essentially characterized by an

involuntary and violent spasm of nearly all the muscles in the body. The muscles that are most usually affected first are those of the neck and jaw, and it is from this circumstance that the popular name of the disease is derived. The spasm then generally extends to the diaphragm and the muscles of the trunk, and large muscles of the extremities; the smaller muscles, particularly of the wrist and hand, often altogether escaping. Very often the muscles of the back are most affected, and cause the patient's body to be projected forward in an arch, and to rest upon the back of the head and the heels. This state is called *opisthotonos*. All the spasms come on in fits or exacerbations, and are attended with extreme pain. There is not any fever, or much general disturbance at all.

Tetanus sometimes comes on merely from exposure to cold, and is then called *idiopathic tetanus*; but in general it is the consequence of an injury, and is then called *traumatic*. It is much more frequent in hot than in temperate countries. It is essentially a disease of the nervous system, but not of the brain, but of the spinal cord. It is a very fatal disease, but recovery does sometimes take place. The treatment essentially consists in the administration of opium.

TIC DOLOUREUX.—Neuralgia of the face. See 'Neuralgia.'

TIN.—Powdered tin is sometimes, but very rarely, administered in cases of tape-worm.

TINCTURE.—A tincture is a solution of a drug, or drugs, in spirit. All tinctures are officinal, and are kept in the shops of the same strength. The following are the most important of them:—

Tincture of Aloes and Myrrh.—Take of

Aloes,.....Four ounces.

Saffron,.....Two ounces.

Tincture of myrrh,.....Two pints.

Macerate for fourteen days, and strain. This is the *elixir proprietatis* of older writers, and is a very good purgative and stomachic.

Tincture of Orange Peel.—Take of

Bitter orange peel } { Three ounces and
(dried), { a half.

Proof spirit,.....Two pints.

Macerate for fourteen days, and strain.

This is a stomachic, and is much used as an adjunct to bitter infusions.

Tincture of Benzoin.—Take of

Benzoin,.....Three ounces and a half.

Storax,.....Two ounces and a half.

Balsam of Tolu,.....Ten drachms.

Aloes,.....Five drachms.

Rectified spirit,.....Two pints.

Macerate for fourteen days, and strain. This is the well-known Friar's balsam. (See 'Balsam.') It is also an expectorant, and is sometimes given in chronic catarrhs.

Compound Tincture of Camphor.—Take of
Camphor,Two drachms and a half.
Opium, powdered,Seventy-two grains.
Benzoic acid,Seventy-two grains.
Oil of anise,A drachm.
Proof spirit,Two pints.

Macerate for fourteen days. This is the very well-known pægoric elixir, and is very much used in chronic chest affections. An ounce of it contains about two grains of opium.

Compound Tincture of Cardamons.—Take of
Cardamon seeds, } { Of each two drachms
Caraway seeds, } { and a half.
Powdered cochineal,A drachm.
Cinnamon, bruised,Five drachms.
Raisins, stoned,Five ounces.
Proof spirit,Two pints.

Macerate for fourteen days, and filter. This is a very agreeable aromatic, and is much used as an adjunct to cordial and tonic mixtures. It also communicates a fine colour, owing to its cochineal.

Compound Tincture of Cinchona.—Take of
Lance-leaved cinchona, } { Four ounces.
bruised, {
Orange peel, dried,Three ounces.
Serpentary, bruised,Six drachms.
Saffron,Two drachms.
Cochineal,One drachm.
Proof spirit,Two pints.

Macerate for fourteen days. This is better known as Huxham's tincture of bark. It is a tonic and stomachic.

Compound Tincture of Cinnamon.—Take of
Cinnamon, bruised,One ounce.
Cardamons, bruised,Half an ounce.
Long pepper, ground,Two drachms and a half.
Ginger,Two drachms and a half.
Proof spirit,Two pints.

Macerate for fourteen days. This is cordial, aromatic, and antispasmodic, and very much employed as an adjunct to cretaceous and astringent mixtures.

Tincture of Digitalis, or Foxglove.—Take of
Foxglove leaves, dried,Four ounces.
Proof spirit,Two pints.

Macerate for fourteen days. This is the form usually chosen for administering foxglove. Save in professional hands, this is a very dangerous preparation.

Compound Tincture of Gentian.—Take of
Gentian, sliced and } { Two ounces and a half.
bruised, {
Orange peel, dried,Ten drachms.
Cardamons, bruised,Five drachms.
Proof spirit,Two pints.

Macerate for a fortnight. This is the bitter tinc-

ture of older writers, and is very much employed as a tonic and stomachic.

Tincture of Hyoscyamus.—Take of
Henbane leaves,Five ounces.
Proof spirit,Two pints.

Macerate for fourteen days. This is an excellent substitute for laudanum when opium does not agree, or is contra-indicated.

Tincture of Kino.—Take of
Kino, bruised,Three ounces and a half.
Rectified spirit,Two pints.

Digest for fourteen days. This is one of the best of the astringent tinctures.

Compound Tincture of Lavender.—Take of
Spirit of lavender,A pint and a half.
Spirit of rosemary,Half a pint.
Cinnamon, bruised,Two drachms and a half.
Nutmegs, bruised,Two drachms and a half.
Red sandalwood, rasped,Five drachms.

Macerate for fourteen days, and filter. This is popularly known as "lavender drops." It is a cordial and antispasmodic, and is much used by hysterical patients to relieve flatulence, gastric pain, &c.

Tincture of Myrrh.—Take of
Myrrh, bruised,Three ounces.
Rectified spirit,Two pints.

Macerate for fourteen days. This is used as a wash for the mouth in ulcerated or spongy gums, as a gargle in relaxed sore throat, and as an application to indolent ulcers.

Tincture of Opium or Laudanum.—Take of
Hard opium, powdered,Three ounces.
Proof spirit,Two pints.

Macerate for fourteen days, and filter. Every twenty-five drops of this very extensively employed tincture contain a grain of opium.

Ammoniated Tincture of Opium, or Scotch Pægoric.—Take of

Benzoic acid, } Of each three ounces.
Saffron, {
Opium,Two drachms.
Oil of anise,Half a drachm.
Spirit of ammonia,One pint.

Digest for seven days, and filter. This is a very useful preparation in chronic and spasmodic affections of the chest. Each drachm and a quarter contains a grain of opium, and this preparation is, therefore, much stronger than the English pægoric, or compound camphor tincture.

Compound Rhubarb Tincture.—Take of
Rhubarb, sliced,Two ounces and a half.
Saffron,Three drachms.
Ginger, sliced,Three drachms.
Proof spirit,Two pints.

Macerate for fourteen days. This is very extensively used as a stomachic and purgative.

Tincture of Squills.—Take of

Squill, fresh, dried,.....Five ounces.

Proof spirit,Two pints.

Macerate for fourteen days, and strain. This is an expectorant, that is much used in chronic pulmonary affections.

Compound Senna Tincture.—Take of

Senna,Three ounces and a half.

Caraway, bruised,....Three drachms and a half.

Raisins,Five ounces.

Proof spirit,Two pints.

Macerate a fortnight. This is the old *elixir salutis*, and is a valuable carminative, stomachic, and purgative.

Ammoniated Tincture of Valerian.—Take of

Valerian, bruised,Five ounces.

Aromatic spirit of ammonia,Two pints.

Macerate for a fortnight. This is, perhaps, the very best antispasmodic, in hysterical cases, in the whole pharmacopœia.

Tincture of Ginger.—Take of

Ginger, sliced,Two ounces and a half.

Rectified spirit,Two pints.

Macerate for fourteen days, and strain. This is a very valuable carminative.

TOBACCO.—This plant has been used from time immemorial by the natives of Oronooka; but it is considered probable that Europeans were not acquainted with its use until after the discovery of the American continent. Sir Walter Raleigh is said to have introduced the custom of smoking it into England. Various attempts have been made to put down its use, and even at the present day there is an anti-tobacco association; but it has steadily become more popular, and the immense quantity of upwards of forty millions of pounds are annually imported into this country.

Several varieties of tobacco are grown. The *nicotiana tabacum* yields the fine and mild Syrian and Latakia. The *nicotiana repanda* is said to furnish what are sold in the shops as Queen's cigars. The *nicotiana persica* yields Shiraz tobacco. But the kind by far most universally grown is the *nicotiana tabacum*.

Tobacco contains a volatile oil, and a peculiar principle, called nicotina. Tobacco smoke also contains ammonia.

Administered internally, tobacco produces nausea, vomiting, tremor, and stupor. To those unaccustomed to its use, similar effects sometimes follow smoking and snuffing; but in habitual smokers and snuffers, tobacco has a very tranquillizing effect, and hence has come to be used almost universally.

TONICS.—Under the name of tonics are comprehended those remedies that, when repeatedly administered to an individual of a weak and relaxed constitution, gradually increase the strength and

tone of the system. When effectual, they pretty generally augment both the appetite for food, and the digestive powers of the stomach. The force of the circulation is also augmented.

The different tonic medicines may be arranged into the pure vegetable bitters, as quassia and gentian; the aromatic bitters, as cascarilla; the astringent bitters, as cinchona; the acid tonics, as oil of vitriol; and the mineral tonics, as most of the preparations of iron.

Tonics produce none of their good effects when febrile symptoms are present. To this remark, however, intermittent and hectic fevers form an exception.

TONSILS.—These glands are situated in the pharynx, and when, as sometimes happens, affected with acute inflammation, constitute the disease called quinsy. They are also liable to chronic inflammation, particularly in scrofulous people, and then give origin to the relaxed sore throat that is so troublesome. This latter is best treated by local astringent gargles.

TOOTHACHE.—This painful affection generally arises from a carious tooth, and from the nerve, in consequence, becoming exposed to the air, and inflamed. Sometimes it is produced by inflammation of the enveloping membrane of the roots, and in both cases there is generally considerable swelling of the adjoining portion of gum. Another form of toothache is a kind of neuralgic toothache, which affects a considerable part of the face, and which is generally called face-ache. Indeed, in almost all cases of toothache, there is more of a neuralgic nature than of pure inflammation.

In general, the treatment consists in applying external warmth, and in repeatedly putting laudanum to the hole in the tooth. Other sedative applications, as camphor, essential oils, and the like, are often also used. It is said that, in the variety of toothache just distinguished as face-ache, half-drachm doses of muriate of ammonia, three or four times repeated, often effect a cure. A quack preparation, that has recently been sold as a panacea for this painful affection, is probably a solution of this substance.

TORMENTIL.—This is the indigenous sept-foil, the root of which is officinal, and is an astringent tonic. In the Orkneys, it is used to tan leather.

TORQUAY.—This Devonshire village is considered to be one of the very best winter residences for consumptive patients that our island possesses.

TRAGACANTH.—This is the gummy exudation of the *Astragalus*, or milk-vetch, three species of which are cultivated in Asia Minor, Greece, &c. A common shop-name for the gum is *gum-dragon*. It is a yellowish-brown, hard, tough, tasteless mass, which forms with water a very tenacious mucilage. It is used as a demulcent in affections of the mucous membranes, and as a vehicle for other medicines

that require to be given in small quantity; as, for example, calomel.

TURMERIC.—This is the root, or rather the rhizome, of the *Curcuma longa*, a plant that is cultivated, on an extensive scale, in India and China. It contains an aromatic oil and a colouring matter. It is much used as an article of food in the form of curry-powder; and it is also very useful to the chemist, owing to its solution, or paper dipped in its solution, being turned to reddish-brown by alkalis. At one time it was considered useful in chronic hepatic affections.

TURPENTINE.—Turpentine is the name given to the oleoresinous juice of several coniferous plants. All these juices agree in yielding, on distillation, a volatile oil and a resinous residuum, and in being soluble in alcohol and water.

TURPENTINE, OIL OF.—This is usually obtained by distilling common turpentine. It is a colourless, limpid, very inflammable fluid. It is used as an external application, and also internally, in chronic mucous discharges, in rheumatism and sciatica, and in larger doses in cases of tapeworm.

TUSSILAGO, or COLTSFOOT, is an indigenous plant, a decoction of which is sometimes taken in chronic chest affections. Long ago its leaves used to be smoked, as tobacco now is.

TUTTY.—Impure oxide of zinc.

ULCERATION.—That process in an inflammation in which the matter absorbed exceeds that deposited, and in which, therefore, a cavity is formed. For the treatment of ulceration, see 'Ulcers,' in Surgical Dictionary for Popular Use.

UNCARIA GAMBIR.—This is a shrub that inhabits the islands of the Eastern Archipelago. Its leaves are boiled, and from them is obtained a substance called gambir, which contains a large quantity of tannic acid, and is one of the most powerful astringents that we possess. It is sold in the shops as a variety of catechu.

UNGUENTUM.—See 'Ointment.'

UPAS TREE.—This poison tree of Japan, as it is sometimes called, has been the subject of many fables. Malefactors under sentence of death were, it was reported, offered their lives if they would go to the upas tree for a box of poison, and yet so fatal were the emanations from it that nine out of ten perished. It does, however, contain a milky juice which is poisonous, but of the exact nature of the poison little is known.

URTICARIA.—See 'Nettle Rash.'

USQUEBAUGH.—A liquor containing anise, and coloured green or yellow.

UVA URSL.—This is an indigenous shrub, growing in dry elevated heaths. The leaves are the official part. They contain tannin, and are used as an astringent, particularly in chronic affections of the urinary organs.

VACCINATION.—Nothing in medicine is more

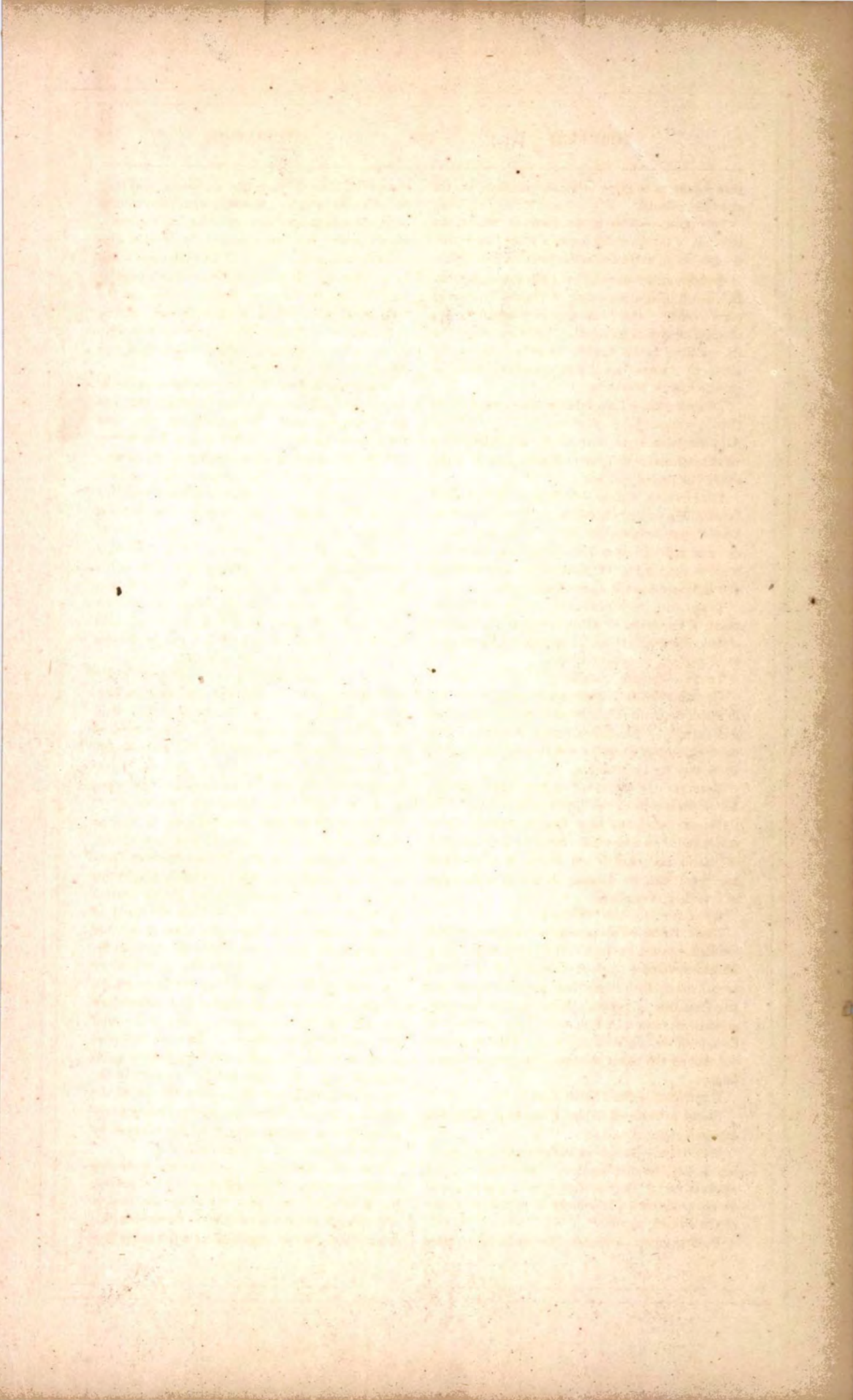
remarkable than the fact, that a disorder, and that too, of a very mild, and, indeed, insignificant nature, communicated to man from one of the lower animals, should protect the former against the dreadful disease of small-pox. This great discovery was made by Dr. Jenner. He found that there was a popular belief in the dairy farms of Gloucestershire, that the milkmaids, who milked cows with sore udders, took, provided their hands were chapped, an eruptive disease, which effectually protected them from ever afterwards taking small-pox.

Jenner investigated the subject with a degree of correct observation and careful deduction that has never been surpassed. He ascertained, first, that while some people who had had sore hands from milking were protected from small-pox, others were not; and he discovered that cows took more than one kind of sores upon their udders, and that it was only one of these, which he soon learned to distinguish, that gave the requisite protection. He next found that the real ulcer only occurred, or at least only originated, in those farms where men were in the habit of assisting at milking; and that the disease generally broke out when the horses groomed by these same men were affected with the affection called grease; and he inferred that the grease was the original beginning of the affection.

He next ascertained that some who were really affected with the true complaint, still were not protected; and he found out that this depended upon the period of the disease in the cow at which the virus was communicated to the milker. When the vesicle in the cow was getting matured, and the matter thick, it excited a severer local complaint than when at an earlier period, but did not give protection.

He then tried if this local cow-pox, or vaccine disease, could be communicated from one human being to another; and if so, if the latter were protected from small-pox. On the 14th of May, 1796—a day still commemorated by an annual festival at Berlin, "matter was taken from the hand of Sarah Nelmes, who had been infected by her master's cows, and inserted, by two superficial incisions, into the arms of James Phipps, a healthy boy, of about eight years old. He went through the disease apparently in a regular and satisfactory manner, but the most agitating part of the trial still remained to be performed. It was needful to ascertain whether he was secure from the contagion of small-pox. This point, so full of anxiety to Dr. Jenner, was fairly put to issue on the 1st of the following July. Variolous matter, immediately taken from a pustule, was carefully inserted by several incisions—but no disease followed."

Ever since that time, vaccination has been very extensively practised, and with the very best results. But it is now found that the protection that it affords is not absolutely complete. Sometimes this occurs from the real vaccine disease not being pro-





VALERIANA OFFICINALIS



PAPAVER SOMNIFERUM



SPARTIUM *SCOPARIUM

duced. Hence it is of importance to be able to recognize the genuine affection. The following are the appearances that ought to present themselves:—On the second or third day after the vaccine matter has been inserted into the arm, the punctures become inflamed and red; and by the fourth or fifth, a vesicle appears, which vesicle contains a little thin, clear liquid. By the eighth day it has very considerably increased, may be noticed to be depressed in the centre, and to contain ten or more small cells. Then an inflamed surface, or areola, forms round about it, which goes on increasing until the tenth day, and begins to diminish on the eleventh, and gradually fades, leaving, however, the place where it was hardened for some days. By this time a dark-coloured crust forms over the vesicle, which falls off about the twentieth day, leaving behind it a circular, depressed cicatrix, dotted with little pits, that correspond with the cells that did exist. On the eighth day there ought to be a little feverishness, and this is considered a test that it is the real vaccine disease that a person is suffering from.

It is always proper, although it is generally neglected, to vaccinate the other arm, four or five days after the first. If the constitution is becoming affected, the second vesicle will run its course much more rapidly than the other one, and, in fact, come to its termination at the same time with it.

There are some individuals in whom the tendency to small-pox is so great, that vaccination affords no protection, just as there are some people who may take small-pox itself twice. But even when a vaccinated person is attacked, it is usually the mild chicken-pox that affects him, and not the dangerous small-pox.

The chicken-pox is attended by little or no fever, or constitutional irritation. In it the vesicles never, unless irritated, become pustules, or suppurate, and they have very little tendency to attack the face.

VACCINIUM.—A genus of plants, two or three species of which are a little interesting:—

Vaccium Myrtillus, or Bilberry. — This is an indigenous shrub, growing abundantly on heaths, which ripens to fruit in autumn. This fruit is acid and astringent, and besides forming an agreeable preserve, is a popular and not unsuccessful remedy in the slight diarrhoeas, &c., that so often occur in autumn. Their juice is used for staining paper and linen purple.

Vaccium Uliginosum, or Bilberry, or Bog-Whortleberry. — This, too, is an indigenous plant the fruit of which is eaten. But it is proper to know, that in large quantities it possesses some narcotic properties. Whortleberries are said to be one of the adulterations added to beer, for the purpose of communicating to it an artificial appearance of strength.

Vaccium Vitis Idæa, or Cowberry. — This is another indigenous shrub. Its fruit is made into a

preserve, which is used as a demulcent and slightly astringent application to sore throats, and in colds. — (See Plate XXI.)

VALERIANA OFFICINALIS. — This important plant is indigenous. The officinal part is the root, which is gathered about August and September. It consists of an underground rhizome, from which root fibres proceed. It has a warm, bitter, and somewhat acid taste, and contains a volatile oil, to which most of its properties are owing, but it also has a peculiar acid.

Valerian is one of the best antispasmodics in nervous diseases that we possess. It is used in epilepsy, chorea, and hysteria. In many cases of this last-mentioned disease, and in nervous pains, it is often very useful.

VANILLA. — A genus of plants, from one or more species of which the vanilla of commerce is obtained. This is the dried fruit, and contains a volatile oil and benzoic acid. It is principally used for flavouring cakes, liqueurs, and chocolate.

VEGETABLE ALKALI. — Potash.

VENISON. — The flesh of the deer. It is generally regarded as being easy of digestion.

VERATRUM ALBUM. — See 'Hellebore, White.'

VERDIGRIS. — See 'Acetate of Copper.'

VERMICELLI. — This dried paste ought to be made from wheat. The grain is stripped of its husk, and roughly ground. This ground wheat is then mixed with water, and made into a paste, by kneading it with a long wooden lever, which renders it very tough and elastic. This is then forced through a cylinder, which gives it its thready appearance.

Maccaroni is made in the same manner, but is in long hollow tubes, which are much thicker than the strings of vermicelli.

Both vermicelli and maccaroni are extremely nutritious.

VERMILLION. — Sulphuret of mercury.

VERTEBRATE. — Animals furnished with a skull and spinal column, for the purpose of protecting the brain and spinal cord.

VESICULÆ. — That class of skin diseases characterized by small transparent elevations of the cuticle, filled with serum.

VINEGAR. — Properly speaking, vinegar is made by subjecting wine to the acetous fermentation; but in this country it is prepared from ale, alegal, or malt vinegar, or from a solution of sugar. Even alegal is very seldom sold, as a cheaper kind may be made by fermenting a solution of malt and ground barley. The sugar and starch are converted, first, into alcohol, and then into æcetic æther. Vinegar manufacturers are allowed by law to adulterate with one-thousandth part of sulphuric acid. Besides this, vinegar consists of water, acetic acid, acetic æther, colouring matter, and a little alcohol.

Vinegar is a powerful antiseptic, and is much used in the preservation of vegetables. Adminis-

tered internally, if properly diluted, it allays thirst and diminishes febrile heat. Habitually taken in large quantities, it diminishes corpulence, and is sometimes taken by young ladies for this purpose. It does so, however, by injuring the digestion, and hence the custom is a very bad one. Applied locally, it is an astringent, and is applied to hæmorrhages; and still more diluted, it is used as a refreshing wash in febrile diseases, when the skin is preternaturally hot.

A mixture of vinegar and honey constitutes an oxymel.

VISION.—Vision depends upon the rays of light that proceed from any object being concentrated by the lens of the eye, so as to form an image upon the retina. When this is done, the sensation is conveyed to the brain by the optic nerve. See 'Eye.'

VOLATIC OILS.—Oils that entirely evaporate on the application of moderate heat.

VOLATILE ALKALI.—Ammonia.

VOMITING.—This is caused partly by repeated and simultaneous contractions of the diaphragm and abdominal muscles, and partly by the relaxation of the œsophagus, the result being that the contents of the stomach are expelled. It is preceded and attended by nausea, and followed by a considerable flow of saliva. During it, too, the stomach appears to have an inverted action. Vomiting is caused by irritations of the stomach, irritation of the fauces, disease of the brain and other organs, and is sometimes brought on by mental emotions.

WATER.—This was once considered to be one of the four elements, but is now known to be essentially a compound of oxygen and hydrogen. It is, at ordinary temperatures, a fluid without colour, odour, or taste; but at 32° it solidifies, and at 212° becomes vapour or steam. In nature, water is seldom or never found in a state of perfect purity, and only composed of oxygen and hydrogen; but, owing to its great solvent and absorbent powers, it contains a large quantity of saline, gaseous, and animal and vegetable substances.

WAX.—The honey-bee elaborates wax from the pollen of flowers, and with it, and with propolis (obtained from the buds of trees), constructs its cells. When extracted from the comb, it constitutes the yellow wax of commerce. This is purified by melting and bleaching, and in this manner is obtained the white wax. In its chemical constitution wax consists of two peculiar substances, *cerine* and *myricine*. It is an emollient and demulcent, and is sometimes administered internally, when ulceration of the alimentary canal is suspected; but its main use is as an external application, and it is the base of all cerates, which take their name from it.

WINTER'S BARK.—This is the bark of the *Drymis Winteri*, and is an aromatic, but is now little used.

WORMWOOD.—The *Artemisia absinthum*, or wormwood, is officinal, but is now very little employed in regular medicine. It is an indigenous plant, and contains a peculiar principle, which has been named absinthin. It is a bitter tonic, and may be employed in dyspepsia. It was long ago used in intermittents.

XANTHINE.—The colouring matter of yellow madder.

XANTHORRHŒA.—A New Holland tree from which a yellow gum has been obtained, which it has been proposed to use in cases of diarrhœa.

YAM.—See 'Dioscorea.'

YAMS.—This is an African disease, but has been conveyed by the coloured men to the West Indies and America. It consists of a number of small red tumours, connected by their bases, and bearing a strong resemblance to raspberries. They occur in all parts of the surface, and are highly contagious. The disease only affects a person once, and most coloured children have an attack of it. The treatment appears to consist in a cooling regimen at first, and afterwards, when the disease has become somewhat chronic, in using local stimulating applications.

ZEA MAYS.—This is the plant that yields the Indian corn. Indian corn is very extensively used as an article of food in America and Asia, and in seasons of scarcity is consumed in this country. But it is inferior as a dietetical substance to both wheat and oats, inasmuch as it contains less gluten. It is apt to produce diarrhœa in those unaccustomed to its use.

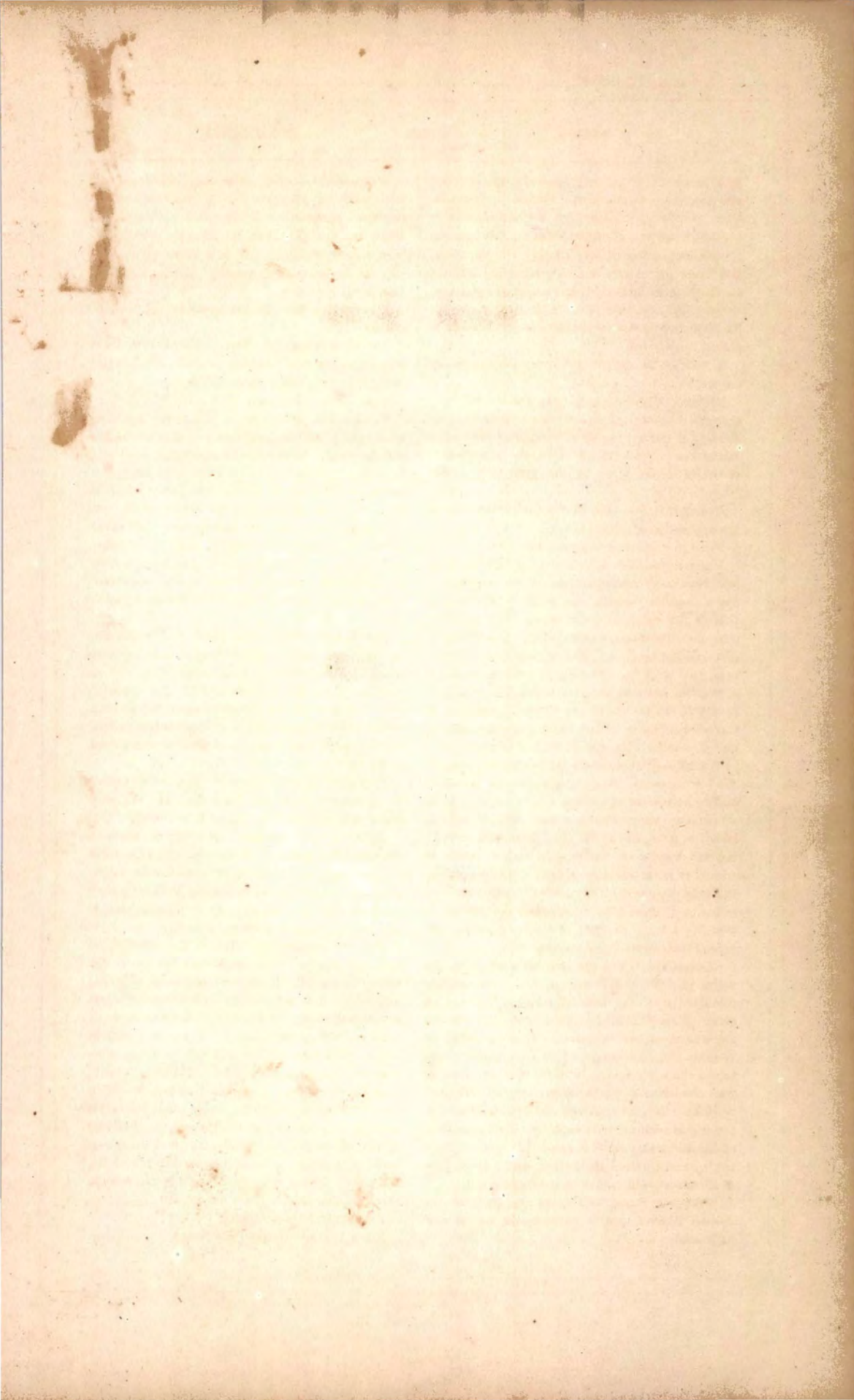
ZIGER.—This is the name of the curd separated by means of acetic acid from the fluid left after cheese has been curdled from milk by rennet.

ZINC.—Ores of this metal are pretty abundant in the mineral kingdom. When separated from these it is a bluish-white metal, of considerable lustre. Owing to its not readily oxidating, it forms a very good material for roofs, &c. In its metallic state it has no action upon the animal economy.

ZINC, SULPHATE OF.—This is the most important salt of zinc. It is sometimes known by the name of white vitriol. It is a transparent colourless salt, soluble in water, and having a strong astringent and metallic taste. Administered in small doses, it is an astringent, tonic, and antispasmodic; and in larger it is a very effectual and safe emetic, producing vomiting with remarkable rapidity. Locally, it is an astringent. It is used as an emetic in cases of narcotic poisoning. In its small doses, it is given in epilepsy, chorea, and chronic ague, and also in hooping-cough. Externally, it is used as an eye-wash, as a gargle, as a dressing for chronic ulcers, and also to chronic skin diseases. It is necessary to take care that its solution is not too strong,

ZINGIBER.—See 'Ginger.'

ZONA IGRIA.—Herpes (which see).



MUSCLES OF THE HUMAN BODY



DICTIONARY OF SURGERY,

FOR POPULAR USE.

AMPUTATION.

AMPUTATION is the cutting off of a limb, or some part of the body, and is based upon the apothegm, "that it is better to live with three limbs than to die with four." It is only justifiable in such cases as the retaining the member would probably cause death.

ANCHYLOSIS.—This signifies the fixed and motionless state of a joint, owing to the articulating surfaces being joined together by bony matter. It is not, properly speaking, a disease in itself, but a consequence of other diseases. Any affection, indeed, which renders a joint motionless for a long period, is apt to induce anchylosis. Thus, the Indian fakirs who, from fanaticism, sometimes maintain one limb in the same position for years, are very liable to have that limb anchylosed. The same occurrence is sometimes witnessed in cases of fracture, which render motion in a joint impossible for a length of time. Then disease in the bones may cause inflammation and disorganization of the synovial membrane, and thus induce the affection.

A certain amount of anchylosis would seem to be almost natural in old age, and at this period of life the ribs are very liable to be anchylosed to the vertebrae, and the vertebrae to one another.

Nothing can be done to cure an anchylosis.

ANEURISM.—An aneurism is generally a pulsating tumour, arising from a dilated or ruptured artery, and filled with blood, which at a later period of the disease becomes coagulated. Surgeons usually divide aneurism into true and false, the former being those in which one or more of the arterial coats remain entire, and the latter those in which the vessel is completely ruptured.

In true aneurism the internal coats are almost invariably destroyed, aneurism by simple dilatation being principally confined to the arteries of the brain, and the aorta.

All the arteries of the body are liable to become affected with aneurism, but the common seat of the disease is in the great trunks, where they give off large branches. The beginning of it can generally be traced to either a blow, a twist, or some sudden acceleration of the heart's action; but as all these are of constant occurrence without producing aneurism, it is inferred that in such cases the internal

coat of the artery has degenerated, and become soft and easily ruptured.

The symptoms of aneurism are tumour, subsiding under pressure, and returning when the pressure is removed; pulsation and throbbing, coldness, numbness, and weakness of the parts beyond the disease, which are often swelled and pained, owing to the pressure of the aneurism upon the bloodvessels and nerves.

An aneurism generally goes on increasing in size, until the artery is completely ruptured. When this event takes place, the contents may coagulate and be absorbed, and the artery become obstructed by the effusion of lymph, or this lymph may not have been effused, and then there is fatal hæmorrhage. The treatment now followed consists in endeavouring to promote this coagulation.

This was at first attempted to be done by lessening the force of the circulation by means of rest, low diet, bleeding, &c., and compression was also tried. But it is now ascertained that by far the most effectual plan is to obstruct the artery between the aneurism and the heart, and this is done by cutting down to the artery, and tying a ligature around it. After the principal artery of a limb is thus obstructed, the anastomosing of the branches, which rise above and below the impervious part, afford so free a channel for the flow of the blood, that bad consequences from imperfect circulation rarely come on. At first, however, the limb becomes cold and numb, and remains so for a few hours after the operation. A state of reaction and excitement then comes on it, which usually, under a low diet and depletion, disappears in a few days.

There is some danger in this operation, both from mortification and hæmorrhage. The latter, when it does occur, usually takes place when the ligature separates. Pressure and depletion may be tried, and, failing that, applying a ligature higher up. The mortification is sometimes owing to constitutional debility, and may be combated by stimulants.

ANTHRAX.—See 'Carbuncle.'

ANTRUM, ABSCESS OF.—The cavity of the maxillary bone is liable to become the seat of abscess, in consequence of the lining membrane of it inflaming and secreting pus. The diagnosis of it at first is

not very clear. A pain is felt in the side of the face, extending from the teeth to the orbit, and is usually considered to be tooth or face ache. The first indication of the true nature of the disease is often given by the escape of a little matter into the nose. This, however, is not always the case, and the disease is not apparent until the whole antrum expands, and, if not prevented by art, a portion of it sloughs off, and gives a vent to the suppurated pus.

The best treatment consists in pulling out one of the grinders, and if the fang of this have not extended into the cavity of the antrum, completing the perforation by means of a gimlet. This gives an exit to the matter. The pain and swelling produced by the operation are to be lessened by fomentations, and sulphate of zinc injections afterwards tried.

ARTERIOTOMY.—Blood is sometimes taken from the body by making an incision into the temporal artery, the name of this operation being arteriotomy. A small aneurism sometimes follows this proceeding, which is now rarely practised.

BISTOURY.—A small knife used by surgeons.

BLEEDING.—See 'Arteriotomy,' 'Cupping,' and 'Venesection.'

BONES, INFLAMMATION OF.—Both the bones and their investing membrane, or the periosteum, are liable to inflammation. The latter, or periostitis, is most frequent in middle-aged adults, who have taken much mercury, particularly if they are of a scrofulous constitution. It is usually characterized by deep-seated aching pain, slight diffused swelling, and a little redness of the integuments that adhere to the affected part. It is remarkably liable to become semichronic, and to be, in such cases, much aggravated at times by changes of weather, and slight constitutional causes. Generally, the pain is greatest during the night, and after meals. The periosteum of the shin bones and of the head, are far more liable to take on this inflammation than that of any other bones.

The treatment consists in applying leeches and hot fomentations, and administering opium, ipecacuanha, and colchicum. When the periostitis becomes more chronic, continued blisters are necessary. It is also very common to prescribe sarsaparilla, and iodine is certainly very often useful.

When the substance of the bone is inflamed, the pain is still more deeply seated, and of a very aching nature. This inflammation occurs at all ages, but chiefly in scrofulous young people. In general, in such it is acute, and terminates in mortification of the affected part. See 'Necrosis.' Its treatment is the same as that of inflammation of the periosteum.

BRAIN.—See 'Head, Injuries of.'

BREAST.—See 'Cancer.'

BUNION.—An inflammation of the bursa mucosa at the inside of the great toe. The adjoining parts become thickened and indurated, the bones of the

joint enlarge, there is dropsical effusion, thickening of the membrane, and often suppuration, with the formation of sinuses that are very difficult to heal. The treatment consists in applying at an early stage leeches and fomentations, and in keeping the affected part at rest, and free from pressure. If sinuses form, stimulating applications may be used, and these failing, they must be laid open.

BURNS AND SCALDS.—The only difference between these two injuries is, that, in the latter, the hot substance that is applied to a portion of the surface is a fluid. The effects of both are to produce increased action of the portion to which they are applied, which becomes red, swelled, and hot; in short, becomes inflamed. The inflammation thus induced generally ends in the effusion of serum, which collects in blisters, but it may go on to suppuration; and if the heat be very intense, it may instantly destroy the part, which will afterwards slough off.

A severe burn, or scald, has an almost immediately depressing effect upon the system, as indicated by great prostration of strength, feebleness of pulse, and coldness of the surface, which last symptom is usually much complained of. This state of collapse may be so great, that the patient will die in it, and this is particularly the case with young or very aged people.

In treating a case of severe burn, this then is the first thing to attend to. A large fire should be made, a number of blankets warmed, and hot water and brandy kept in readiness. When the collapse appears, the patient should, if possible, be put into the warm room, enveloped in warm covering, and have stimulants administered until the shivering fit and the depression be over.

A great many plans of locally treating burns are practised. Enveloping them in cotton wad, kept pretty firmly applied by means of a binder, is perhaps the most successful, and the most comfortable to the patient. When blisters rise they should not be punctured, unless they become painful and filled with a turbid fluid. The action of the cotton probably depends upon its preserving the injured parts from contact with the air. Formerly, a mixture of lime-water and linseed-oil was often used for the same purpose, and sometimes, too, in the same manner, the injured part was dusted with flour.

Another mode of treating recent burns and scalds, almost obsolete in this country, but still, it is said, common in the United States of America, consists in the local application of stimulants. This practice was introduced by Dr. Kentish, and his plan was to apply oil of turpentine warm, by means of lint soaked in it, the lint being kept in its place by means of some plaster. This was allowed to remain on about four and twenty hours.

After a severe burn there will always be an ulcer left, and generally some slough to come off, after

which the ulcer will have to be treated. Ulcers formed by burns are always of a most obstinate nature, and usually take a very long time to get well. Various stimulating applications, as sulphate of zinc lotion, resin ointment, and the like, should be applied to them, exuberant granulations kept down by the application of caustic, and very great care taken that inconvenient contractions and adhesions of the granulating surface do not take place. The discharge from these ulcerating surfaces is usually of a debilitating nature, and the strength requires to be kept up by a tonic regimen and diet.

Why, it is not easy to say, but during cases of burns, inflammation of the mucous membrane of the duodenum is very apt to come on.

BURSÆ MUCOSÆ, INFLAMMATION OF.—All the bursæ are liable to both acute and chronic inflammation. The treatment in the acute form consists in applying leeches and hot fomentations, along with rest; afterwards, when the disease becomes more chronic, putting on blisters and prescribing iodine.

CALLUS.—This is the osseous substance which serves to unite the ends of a broken bone.—See 'Fracture.'

CANCER.—The morbid structure which is denominated carcinoma, or cancer, is distinguished in its earlier stages by its great firmness and hardness, and is in this state often called scirrhus. This dense texture is not a homogeneous mass, but has numerous interstices that are filled with a yellow friable substance, usually extended into the neighbourhood in diverging bands. The matter of cancers, too, is taken up by the absorbent vessels, and by them deposited in other parts of the body.

It is for this reason, perhaps, that cancer is principally found in glandular parts, as in the breast, the glands of the neck, arm pit, &c. It generally comes on in mature life, and never, perhaps, is known to occur in children. In those individuals who have the tendency to have cancer, a very small and trifling cause seems able to excite it, as a slight blow or bruise; but in those very strongly predisposed to it, cancer comes on without the sufferer being able to remember the occurrence of any exciting cause whatever.

The first indications of cancer are hardness and pain, the latter being only of occasional occurrence, and of a lancinating nature; then the neighbouring parts become inflamed, and ulceration begins, and this ulcer never shows any tendency to heal, and constitutes a cancer proper. The edges of this ulcer are of course very hard. The discharge from it is fetid and profuse, and the pain attending it incessant and of various kinds, but usually most intense. The sufferer loses appetite, and is unable to sleep; exhaustion comes on, and at length, completely worn out with suffering, he dies. The rapidity with which this fatal event comes on, varies very remarkably in different cases, death ensuing some-

times in two months after the first appearance of the tumour, and the disease sometimes remaining in a chronic state for a great number of years.

The only cure for cancer is cutting it out; for neither spontaneously, nor under the influence of remedies, does it ever get well. In those predisposed to it, something may, perhaps, be done, in the way of prevention, by obviating pressure. It is always proper, too, to leech and foment during paroxysms of pain at an early stage, and opium and other narcotics should be administered both internally and externally.

There is little hope of extirpating cancer after it has been taken up by the system, and appeared in other parts of the body different from where it first showed itself.

CANCERUM ORIS.—This is a deep, foul, fetid ulcer, with irregular edges, on the inside of the mouth and lips of children, that has a strong tendency to run into gangrene. It occurs generally at the age of from eighteen months to seven years, and almost always in unhealthy and ill-fed children, particularly in such when they live near a marsh, and are not kept clean. It has occasionally appeared somewhat contagious. It is generally accompanied by low fever.

A severe case is almost certainly fatal, as there is no way of stopping the sloughing. Taken in time, and not in very severe cases, the malady may be arrested by the application of caustics. The strength of the patient should be kept up by stimulants.

CARBUNCLE.—This is an affection of the skin, which consists in an inflammation spreading from the place where it begins in a circular form, attended with very severe pain, and ending in chronic supuration, with more or less of sloughing. It occurs in those parts of the skin that are thickest, and abounds most in the nape of the neck and the back. The matter from it comes out by several apertures, which are, however, so small that they do not allow of a sufficient exit of it. It is attended with great induration.

Carbuncles sometimes produce so much irritation as, in old people, to become fatal. It is, indeed, always a constitutional disease, and is generally produced by long-continued derangement of the digestive organs.

The treatment consists in relieving the tension (upon which the pain depends), and letting out the matter by a crucial incision, in then applying poultices, and in trying to amend the general health.

There is another form of carbuncle that fortunately has not been seen in this country for nearly two centuries, and which is one of the symptoms of the plague.

CARIES.—This is a malignant ulcer of a bone. It very much resembles cancer in glandular parts, save that it is not characterized by any peculiar deposit. The local symptoms of it vary both in the degree of

pain, the appearance of the discharge, and the nature of the orifice. Generally, the pain is of a dull gnawing nature, the discharge thin and sanious, and the orifice small and callous. During the course of the disease, a good many remissions usually take place, and the pain abates, the discharge stops, and the orifice appears to be closing up. But these are always illusory, and relapse invariably comes on, until the patient, worn out by the discharge and pain, dies. The disease occurs at all ages, but more frequently in children, and is usually connected with a scrofulous constitution.

Caries, not being owing to the deposit of a morbid matter, like cancer, is not apt to be carried to other parts of the system. Hence the destruction of the affected part by caustic, or the actual cautery, may rid the patient of his disease; but, in general, incision will be the most effectual, and probably the least painful cure.

CARTILAGES, ULCERATION OF.—Ulceration of the cartilages of joints occurs in scrofulous individuals, and also in those who have suffered much from rheumatism. The exciting cause is generally either a strain or exposure to cold. It is indicated by deep gnawing pain in the affected joint, much aggravated by motion, and always worse at night. The whole limb is generally weak and œdematous. At first there is no swelling, and even the swelling that afterwards comes on is usually not very great, although extremely hard.

In some cases, the disease spontaneously recovers, a little stiffness of the joint remaining, owing to the cartilage that has been ulcerated never being properly restored. In other instances, this ulceration of the cartilages of joints goes on to suppuration, and the pus bursts externally.

The treatment consists in perfect rest, attention to the general health, and constant counter-irritation by means of issues.

CATAPLASM, OR POULTICE.—These external applications are very much employed in surgical practice. The following is the mode of making the more common of them:—

Vinegar Poultice.—This is made by mixing vinegar and bread crumbs together, and is applied cold in cases of sprains and bruises.

Alum Poultice.—This is made by stirring the whites of two or three eggs with a bit of alum placed between two bits of rag; it is applied to the eye when inflamed, and also to chilblains.

Malt Poultice.—This is made by mixing powdered malt and yeast together, and is applied to gangrenous sores.

Charcoal Poultice.—This is composed of linseed meal, hot water, and powdered charcoal, and put upon ulcers that have a fetid smell.

Conium Poultice.—To make this, two ounces of conium leaves are boiled with a quart of water until only a pint is left, and this is then mixed with lin-

seed meal. It is applied to cancerous sores, and to irritable scrofulous ones.

Foeglove Poultice.—This is made by mixing digitalis leaves with linseed meal, and is used in the same kind of cases as the preceding.

Carrot Poultice.—This is mashed carrots, and is applied to sloughing ulcers.

Bread-and-Milk and Linseed Poultices.—These are the usual applications in cases of external inflammation, when it is wished to apply warmth and moisture.

CATARACT.—Both the lens and its capsule are liable to opacity, which more or less impedes vision, and constitutes the disease called cataract. The lens, when thus affected, is sometimes softer, and at others harder, than natural, and hence the systematic writers describe a hard, soft, and milky cataract.

The causes of cataract are very obscure. One of the predisposing causes of it is old age, and the tendency to it seems to be hereditary. The exciting cause is sometimes a blow upon the eye, but is as often not appreciable.

Cataract may be known by two positive and one negative symptom. First, the pupil, instead of being black, is brown, yellow, or white. Secondly, the vision is defective, and there is sometimes complete blindness, except that the power remains of discerning the outline of objects held between the eye and the light. Thirdly, the iris is moveable.

In general, cataract comes on gradually, the opacity, and, consequently, dimness increasing by slow degrees. During this progress, the patient always sees best in an obscure light, because in such the pupil dilates most, and exposes the lens towards the circumference, where the opacity is always least.

The only cure for cataract is a surgical operation, and three methods of thus treating it are in use. One of these is called couching, and consists in putting a needle into the eye, and pushing down the opaque lens. Another consists in cutting out the lens altogether; and the third consists in introducing a needle and breaking up the lens into bits, which are subsequently absorbed.

The best mode of treatment is held to be, in general, to introduce a curved needle through the sclerotic, and depress the lens, if found to be firm, and to break it up, if soft.

After the operation, the patient requires to be confined for some days to a darkened room, and observe an antiphlogistic regimen.

CAUTERY, ACTUAL.—This term signifies the application of the red-hot iron, in order to produce an issue, as a means of counter-irritation. The adjoining parts are protected by folds of moistened brown paper, and a poultice is applied until the slough separates. "The actual cautery," says an eminent surgeon, "is the best method of the whole (of making an issue), since the breach which it oc-

casions requires no means for keeping it open, and does not heal until after many weeks or months, or healing applications are employed. The pain is severe, but almost momentary, and on the whole much less than that of the caustic, and the counter-irritating effect is found to be greater than that of any of the other means. The iron should have a sharp edge, not more than the eighth of an inch broad, in order to burn the skin deeply, or rather through its whole thickness, since, unless this be done, in adults at least, the pain is very inconsiderable and of short duration. It should be used as hot as possible.*

CERATE.—A hard ointment. These are much less used than they formerly were. They are still, however, a good deal employed, and there are official directions given by the colleges for making them. The most important of these are the following:—

Cerate, Simple.—Take of

Olive oil,.....Four ounces.

Bleached wax,.....Four ounces.

Melt the wax and add the oil, carefully stirring it till it cool. This is a mild and cooling dressing.

Cerate, Calamine.—Take of

Calamine,..... } Each half a pound.
Wax,..... }

Olive oil,..... Sixteen ounces.

Add the calamine to the melted wax and oil when they begin to thicken. This is an excellent desiccative and astringent application to the ulcers formed by burns, scalds, &c.

Cerate, Spermaceti.—Take of

Spermaceti,.....Two ounces.

White wax,.....Eight ounces.

Olive oil,.....One pint.

Heat the oil gently, and add the wax and spermaceti. Stir the whole briskly till it is cooled. This is very much used as a mild and simple dressing for blisters and excoriations.

Cerate of Acetate of Lead.—Take of

Acetate of lead, powdered,....Two drachms.

White wax,.....Two ounces.

Olive oil,.....Eight ounces.

Mix. This is a very excellent application to irritable ulcers.

Cerate, Lead Compound.—Take of

Prepared chalk,.....Eight ounces.

Distilled vinegar,.....Six ounces.

Plaster of lead,.....Three pounds.

Olive oil,.....One pint.

Mix the chalk with the vinegar, and, when the effervescence has ceased, add gradually the solution to the plaster and oil melted with a slow fire, and stir constantly until they are cooled.

This is, perhaps, the best cerate that we possess for dressing indolent ulcers, particularly when occurring on the leg.

* Syme.

Cerate, Resin, or Basilicon Cerate.—Take

Resin,..... } Of each one pound.
Wax,..... }

Olive oil,.....Sixteen ounces.

Melt the resin and the wax together with a slow fire. Then add the oil, and press the cerate through a linen cloth. This is a mild stimulant, and very much applied to indolent ulcers.

Cerate, Savine.—Take of

Savine, bruised,....One pound.

Wax,.....Half a pound.

Lard,.....Two pounds.

Mix the savine in the lard and wax melted together, and strain. This cerate has a fine green colour, and is used for dressing blistered surfaces in which the discharge is desired to be kept up.

CHEMOSIS.—When the inflammation of the conjunctiva is very intense, the conjunctiva is sometimes so swollen as to become obviously turgid. This state is called chemosis. See 'Conjunctiva, Inflammation of.'

CHILBLAINS are the effect of inflammation arising from cold. A chilblain, in its usual form, is attended by a redness of skin, considerable heat and itching, and some swelling. If it get worse, the heat, itching, and swelling increase until vesicles arise, which burst, and leave excoriations, which are very liable to become converted into very ill-conditioned sores.

Chilblains usually occur in people who have a languid circulation, and who allow their hands and feet to pass rapidly from cold to heat, and *vice versa*. It is upon the hands and feet that they almost invariably occur. They are best guarded against by avoiding such alternations. When they appear, and before they burst, they are best treated by an embrocation of soap and opium liniment, mixed with one-sixth part of tincture of cantharides, and the ulcers that form should be dressed with the ointment of the red oxide of mercury.

COLLYRIUM.—A lotion, intended to be applied to the eye.

CONJUNCTIVA, INFLAMMATION OF.—The conjunctiva is remarkably liable to inflammation. Such is set up in it by exposure to bright light, intense heat, cold winds, dust and foreign bodies, and also by disorders of the stomach, &c. Also, when the conjunctiva has been once inflamed, the inflammation is very apt, from very slight causes, to recur.

This inflammation occurs in very different degrees of intensity, being sometimes very acute, and at others quite chronic. In the acute forms, there is great redness and injection of the affected membrane, swelling of the eyelids, and great secretion of tears, intolerance of light, pain in the eye, with the sensation of sand in it, and symptomatic fever. This latter is absent in the chronic form, and in such the other symptoms are far less urgent.

In treating inflammation of the conjunctiva, it is,

above all, necessary to protect the eye from all sources of irritation. This is best done by darkening the room, and keeping the eye constantly covered with linen cloths, dipped in evaporating lotions, and changed from time to time, or with bread-and-milk poultices. If the fever be great, bleeding is proper; and in acute cases, the application of leeches, in the neighbourhood of the inflamed organ, is always advisable, and saline purgatives should be administered. When the disease is becoming semi-acute, blisters behind the ear are very serviceable. Should chemosis come on, the distended membrane may be cut with a pair of scissors.

When the inflammation gets decidedly chronic, local stimulants are proper, and, perhaps, the best of these is a drop or two, twice a day, of the opium-wine.

The discharge, in chronic inflammation of the conjunctiva, sometimes becomes quite purulent, constituting the disease called purulent ophthalmia. This inflammation is very apt to extend to the other tissues of the eye, and, by producing ulcerations and adhesions, induce blindness.—See ‘Ophthalmia.’

CONTUSED WOUNDS.—See ‘Wounds.’

CORN.—A corn consists of a thickening, or induration, of the cuticle, always induced by pressure, under the influence of which the secreting power of the cutis is augmented. Of all parts of the body, the toes are the most liable to this excrescence, particularly the sides of them. In time, a bursa often forms underneath them, which, by inflaming, gives much pain.—See ‘Corns,’ in Dictionary of Medical Science.

CORNEA.—In consequence of ophthalmia, ulcers are frequently formed upon the cornea. These are usually small, round, of a brownish colour, and very irritable. If large and deep, they leave, when they cicatrize, a permanent white spot, called leucoma. When these become at all chronic, they are best treated by being touched with a solution of nitrate of silver.

Instead of an ulcer, there is sometimes, in consequence of inflammation, opacity of the cornea, from lymph being effused into its structure, or upon its conjunctival covering. This latter is called *nebula*, and is shown in fig. 4, Plate XIII. This is a very common affection in children, and often, as may be supposed, materially interferes with vision. The treatment consists in the daily application of solution of nitrate of silver.

COUCHING.—The depression of a cataract out of the line through which the rays of light pass.—See ‘Cataract.’

CREPITUS.—The grating noise, or sensation, occasioned by the ends of a fractured bone, when they are rubbed against one another. It is one of the most decisive symptoms of a fracture.

CUPPING.—This mode of obtaining blood is performed by means of a scarificator and a glass. Be-

fore the operation, the part should be well fomented. The glasses should have wide mouths, and be frequently emptied, in order to prevent the blood from coagulating.

After the cuts have been made by the scarificator, the glass, having the air exhausted in it, is placed over, and, owing to the pressure of the atmosphere being thus removed from the part, the blood rapidly flows.

Cupping is superior to leeching, inasmuch as the blood is abstracted more rapidly, and a given quantity more certainly taken.

CURVATURE OF THE SPINE.—See ‘Vertebrae, Diseases of.’

DIRECTOR.—This is a little grooved silver instrument, invariably placed in the pocket-case, and in constant requisition, to direct the knife, and to protect the parts underneath from its edge or point.

DISLOCATION.—This word means the displacement of the respective surfaces of a joint. In some instances there is a wound also, which lays open the joint. When this latter is the case, the dislocation, in the language of surgery, is said to be compound. The principal causes of dislocation are either external violence, or inordinate muscular action.

“Of the symptoms of dislocation,” says Syme, “the most constant and characteristic one, especially as a distinction from fracture, is immobility, or fixity, when motion of the limb is attempted, either by means of its own muscles, or by an external force, which depends upon the unnatural position of the articulating extremities of the bones, and the contraction of the surrounding muscles. The limb is generally shortened, but sometimes it is lengthened; and when the latter is the case, there cannot, of course, be any suspicion of fracture. There are also, attending the accident, deformity, from the altered position of the bones; pain or numbness, from their pressure on the muscles and nerves; and swelling, with coldness, from obstruction of the bloodvessels.”

The treatment of dislocation consists in restoring the articulating surfaces to their natural place, and this is managed by the two processes, technically called extension and coaptation. The limb is extended, so as to draw back the bone to the point where the muscles began to effect its displacement, and then it is pushed in a direction opposite to that which the original violence acted in. In order to render the muscles weaker, it is common to bleed the injured man, and give tartar emetic. After the dislocation has been reduced, the joint must be protected from anything that can again cause dislocation, and kept perfectly quiet, and fomented, to allay the pain and inflammation.

When the joint is laid open, the synovial membrane inflames, and a very serious disease is produced. The dislocation should be immediately reduced, and the edges of the wound be placed in

contact, and kept wet with evaporating lotions, while motion should be prevented by means of splints.

EAR.—The surgeon is often called upon to interfere with the ear. Children are prone to put peas, and other small bodies, into their ears, which stick there, and excite inflammation. A quantity of indurated wax, too, generally collects around these foreign bodies, and renders their extraction more difficult. The best plan, in such cases, is to inject warm water, with a powerful syringe, into the ear, for some time, and then carefully take out the foreign body with a forceps.

The wax of the ear sometimes collects in such quantities as to produce deafness. When this is the case, it should be washed out with a syringe. An ear-syringe should contain, at least, six ounces of water, and work so as to drive in the water with force. In general, it will require to be discharged six or seven times, ere the pellets of wax are washed out.

Sometimes the wax is imperfectly secreted, and the meatus and membrane of the tympanum become preternaturally dry. This sometimes appears to be connected with rheumatism. Cotton-wad, dipped in oil, should be kept in the ear, and exposure to cold avoided.

The internal ear, particularly in scrofulous subjects, is liable to become inflamed. This inflammation is attended by a good deal of severe pain and constitutional fever. It is very apt to end in supuration, and if the pus be effused within the tympanum, caries of the temporal bone is very apt to be induced. The treatment consists in warm fomentations, bleeding, and the antiphlogistic regimen. If the discharge becomes chronic, blisters may be applied behind the ear, and stimulating washes injected.

Polypi sometimes grow in the ear. They should be pulled out with a pair of forceps, and their roots rubbed with caustic.

ECCHYMOSES.—This is the injection of blood into the cellular tissue, consequent upon a blow. It is characterized by its dark colour and swelling. The blood thus effused is gradually absorbed, and during the period of absorption, the dark colour passes through various shades of red, green, and yellow. The treatment consists in applying moderate pressure and stimulating lotions.

Sometimes, when the injury has been very severe, a large clot of blood is effused, which may excite inflammation, and end in an abscess. When this is apprehended, evaporating lotions should be applied, in order to try to check this.

ECTROPIUM.—This is a turning out of the edge of the lower (sometimes also the upper) eyelid, by which the lining membrane is exposed to the irritation of the air, and the tears run over, down to the cheek. This state may be produced by several

causes, and its treatment, therefore, varies. Sometimes it is caused by a thickened state of the mucous membrane of the eyelid, and, when this is the case, nitrate of silver should be applied. When, as is sometimes the case, it is owing to unnatural relaxation of the eyelid, the plan followed is to cut a piece out of the middle of it, and join the cut edges together.

EMPHYSEMA.—The emphysema of the surgeon is altogether a different disease from the emphysema of the physician. The emphysema of the surgeon means the presence of air in the cellular tissue under the integuments of the chest. To produce it, it is necessary that there should be an aperture in the costal pleura. This may either be a penetrating wound in the parietes of the chest, which is so situated as to allow the air to enter the chest during inspiration, but which opposes its exit during expiration. The other way in which it may be produced is by a wound of the *lungs* and costal pleura—and this is not a very rare occurrence—from the specula of bone of a broken rib.

When in either case the air enters the cellular tissue, it diffuses itself, and creates a swelling of the integuments, which is recognized by a crackling sensation that is felt on pressing on it. The swelling is generally confined to the side of the chest where the wound is, but it may extend all over the body.

The treatment consists in applying a compress over the wounded part, so as to prevent any more air going in, and, if necessary, in making punctures, to let out what is in. But this should not be done unless the air is producing much inconvenience, as, if let alone, it soon disappears.

ENCANTHIS.—This is a tumour that sometimes grows from the inner angle of the eyelids. It grows from the *caruncula lachrymalis*, has a fleshy consistence, and is of a red colour. It impedes the motion of the eyelids, and should be cut out.

ENTROPIUM.—This is inversion of the margin of the upper (and sometimes of the lower) eyelid. It is generally a consequence of the swelling of *ophthalmia tarsi*. It produces great uneasiness, and often inflammation of the cornea.

The plan of treating it, is cutting out a portion of the integuments of the lid, so as to tighten and draw up its external margin.

EPIPHORA.—This is the name given to the obstruction of the lachrymal duct, in consequence of which the tears cannot run into the nose, but trickle down the cheek. It usually occurs in people who have been suffering from chronic *ophthalmia*, and in whom the inflammation appears to extend into the lining membrane of the lachrymal duct. The obstruction may be immediately known by the distension of the lachrymal sac, which forms a flattened, round tumour at the inner side of the eye, which is immoveable, and by the flow of tears over the cheek.

The treatment consists in attempting to remove the cause, and to dilate the orifice by means of probes. This latter measure failing, an incision must be made through the lachrymal duct, and a small tube, made of silver, introduced into it, so as to form a channel for the tears. This tube requires to be taken out and washed every day, although it is often allowed to remain in for a long period, in which case it is liable to excite inflammation.

EUSTACHIAN TUBE, OBSTRUCTION OF.—The Eustachian tube is liable to be obstructed at its end next the pharynx, from several causes. Of these, the most important are, thickening and adhesion of the lining membrane, consequent on inflammation, &c. This state is attempted to be relieved by passing tubes, and sometimes by making "an opening in the membrane of the tympanum, so as to place it in equilibrium as to the pressure of the atmosphere on its internal, as well as external surface. Numerous attempts have been made with this view, and frequently with temporary benefit. The return of deafness, which the patient has almost always suffered, has been ascribed to closing of the aperture; and various modes of making it have been proposed, in order to prevent the edges of the wound from uniting. It is probable, however, that the relapse depends on other circumstances, as it is not easy to conceive how the edges of such wounds could unite, except as a rare accident, and since the deafness has returned even after a part of the membrane was actually removed."

EXFOLIATION.—See 'Necrosis.'

EXOSTOSIS.—It is now proposed to restrict this term to an unnatural growth of bone. An exostosis is sometimes solid, sometimes hollow, and at others composed of radiating points.

The first of these kinds is the most common. Sometimes it is thin and flat, and does not cause any sharp projection—in which case it is called a 'Node,' a term which is also used to denote a partial enlargement of the periosteum. At other times, again, solid exostosis forms an abrupt projection. The bones thus affected are generally the thigh-bone, the shin, the lower jaw, and the great toe. If it become very painful, it requires to be removed by an operation.

The hollow and radiating forms of exostosis are merely symptoms produced by morbid growths, &c., in the neighbourhood.

EYE, DISEASES OF.—See 'Cataract,' 'Ophthalmia, &c. &c.'

EYE, EXTIRPATION OF.—The eye sometimes, but not often, becomes the seat of malignant growths, especially of medullary sarcoma.—See 'Medullary Sarcoma.' The only treatment is excision of the eye at a very early period of the disease, before the morbid process has advanced so far as to render the operation impossible.

EYELIDS, CANCER OF.—Cancer sometimes affects the eyelids, and, in such an occurrence, excision is

the only remedy. It is found that the whole of the lower lid, and a part of the upper one, may be extirpated, without depriving the eye of its protection from irritation from without.

EYELIDS, ENCYSTED TUMOURS OF.—These are common, and when they occur, they are generally situated in the upper eyelid. Generally, they lie close to the conjunctiva, and the incision to cut them out requires to be made from underneath.

EYELIDS, OTHER DISEASES OF.—See 'Ectropium,' &c. &c.

FEVER.—Two kinds of fever are interesting to the surgeon—the inflammatory and the hectic. Both are fully described in other parts of this work.

FINGERS.—Sometimes the fingers are supernumerary, and it may be necessary to extirpate some of them. The ring finger is liable to a peculiar kind of permanent flexion, that comes on in individuals who have been in the habit of handling bodies of great hardness. The other fingers, although much less frequently, are involved in the affection. This depends on a tension of the palmar fascia, and will probably always be relieved by an incision over the metacarpo-phalangeal joint.

FISSURE.—A fine crack in a bone is so called.

FISTULA.—This is the name given to an opening, the consequence of a wound, an abscess, or ulceration. It has little tendency to heal, and is connected with a canal, running more or less deeply into the soft parts.

Formerly, very severe operations were considered necessary for the cure of fistula; but they are now treated on general principles.

FLUCTUATION.—This is the name given to the perceptible motion communicated by purulent matter, or other fluid, when the fingers are pressed alternately on the surface, in such a manner that the fingers of one hand are lightly tapping, while those of the other are gently pressing.

FOMENTATION.—This is the application of flannels or cloths dipped in hot water, or in some medicinal decoction. Simple fomentation with hot water is used to relieve pain, lessen inflammation, or promote suppuration. When the object is mainly to relieve pain, anodynes are added. Some particular fomentations are used to introduce drugs into the system. The following five fomentations are the most common.

Camomile Fomentation.—This is made by pouring hot water upon camomile flowers, and is in very common use in bruises, sprains, &c.

Poppy-head Fomentation.—About a poppy-head (bruised) to a quart of water makes this fomentation, which is very useful in cases where there is much pain.

Acetate of Lead and Opium Fomentation.—Take of
Acetate of Lead, } Each, one drachm.
Opium, }
Boiling Water, Twenty ounces.

Dissolve, and when well mixed with an equal quantity of boiling water (to keep it warm), is useful in erysipelas, &c.

Conium or Hemlock Fomentation.—Take of

Powdered Hemlock, Three ounces.

Water,.....Three pints.

Boil down to one pint. Used in cases of scrofulous and cancerous sores.

Gall Fomentation.—Take of

Bruised Galls,.....Half-an-ounce.

Boiling Water,.....Two pints.

Macerate for two hours. Used as an astringent.

FORCEPS.—This is an instrument used in surgery to take hold of objects that cannot be grasped with the fingers. They are made of a great many sizes and shapes.

FRACTURES.—Bones may be broken in three ways:—First, by direct violence applied to them; second, by violence, causing such a strain upon the bone as to snap it, not where the force is applied, but at some other part of its extent; and, third, by the inordinate action of the muscles. This last cause, however, is a very uncommon one. Although fractures occur in all ages, the bones in which they most usually occur vary at different periods of life. In children, the arm bone, the thigh bone, and the collar bone are most liable to break; in adults, the bones of the leg and fore-arm, the shaft of the thigh, the humerus, the collar bone, and the ribs, are most frequently fractured; while in aged people, the neck of the thigh bone is the most likely to yield.

Sometimes, in the case of a fracture, the bone is exposed by a wound. This is named a compound fracture, and is a much more serious affair than when this is not the case, or when, to use the technical expression, the fracture is simple.

The symptoms produced by a simple fracture are—change of shape, owing to the broken bone being unable to counteract the displacing tendency of the muscles, and hence, too, there is shortening, diminution, or complete loss of the power of motion, while the hands of another person may make unnatural motion; swelling from the effusion of blood from ruptured vessels; pain and starting; and, lastly, crepitus.

No part of the human body is so remarkable for its power of reproduction as bone. Hence fractures, if properly treated, are very remediable. A good deal of discussion has taken place as to the process by means of which reunion takes place. The following is a summary of what seems well ascertained:—

“In the first place, the parts which form the cavity that encloses the fractured extremity of the bone, together with more or less blood, become thickened and consolidated by the internal effusion and organization of lymph. The medullary membrane undergoes a somewhat similar change, while

the surface of the bone acquires a thin lining of gelatinous-looking lymph. The sort of shell or case, which is thus formed by the indurated periosteum, muscles, fat, or whatever tissue happens to be in the way, gradually becomes firmer, and has ossific matter deposited in its substances, generally in small specks at many different points, but in largest masses where it is connected with the old bone, which is always where the periosteum still adheres to it, so that the portion of bone from which the periosteum has been torn off at the time of the injury, is enclosed within the capsule. The broken extremities are then by degrees joined together, and rendered immovable, but still remain unable to resist any considerable force that tends to separate them. The process of ossification then proceeds inwards from all the surface, both of the old bone and of that newly formed. A gelatinous sort of mass, or sometimes blood, fills the cavity that exists while this is going on; and when the case is completed, the bone possesses more strength at the injured part than at any other portion of its extent.”*

The time which this process requires is different in different bones, being, as may naturally be supposed, longest in the long bones. It is most speedy, too, in young and healthy people. Absolute rest is indispensable for it, and if this be not the case, instead of a union, an artificial joint is formed.

The treatment proper for a simple fracture will now be obvious. The broken ends must be accurately adjusted, and all motion in the broken part prevented by surrounding it with splints, kept in their place by means of a bandage.

A compound fracture is a very dreadful and dangerous accident. Violent inflammation, ending in gangrene, is very liable to come on, and if mortification be avoided, extensive and debilitating suppuration is apt to occur. The bone should be set as soon as possible, and inflammation tried to be kept down by cold applications and the antiphlogistic regimen; and afterwards, if there be much suppuration, the strength requires to be kept up by tonics, wine, &c., and the local applications to the wound must be of a stimulating and astringent nature.

FRÆNUM OF THE TONGUE SHORT.—In infants the tongue is sometimes too closely tied down, by the frænum being so short that the child cannot suck. It is very rare, and when it occurs may be remedied by cutting the frænum. Mothers are apt to suspect the affection when a child is long of talking.

FRAGILITAS OSSIUM.—This is an unnatural brittleness of the bones, and it is in individuals affected by it that spontaneous fractures usually take place. With some people it seems to be constitutional, and not connected with any other disease. Of this a good many cases are on record. Dr. Good was once at a church where an old lady

* Syme.

broke both her thigh bones simply by kneeling down; and, on being lifted to be carried home, her arm bone broke too. In general, however, this unnatural fragility depends either upon scurvy, or a long-continued cancer in some part of the body. How the latter comes to produce it, it is difficult to say, but the fact is certain, and many cases are recorded in which fractures have occurred in cancerous patients from so slight a cause as turning in bed.

FROST BITE.—If a part be exposed to intense cold, it becomes pale, insensible, and shrivelled. In this state, however, it is not yet dead. In treating it, the great matter is to restore the temperature very slowly. If this be neglected, a moderate amount of heat produces an effect similar to a burn, and induces inflammation, that almost invariably ends in mortification. At first of all, the part should be rubbed with snow or cold water; if inflammation comes on, warm acetate of lead and opium solution should be applied; and if the result be mortification, the best dressing is the resinous ointment with oil of turpentine.

FUNGUS.—Any sponge-like excrescence in a wound. Large granulations are often called by this name.

FUNGUS HÆMATODES.—See 'Sarcoma, Medullary.'

GANGLION.—By this word the surgeon means a tumour upon a tendon, which is composed of a bag containing some fluids. These bags vary greatly in thickness, and occur most frequently at the wrist and ankle, and oftener in females than in men. They give little or no pain, and are generally thought to have followed a strain.

The treatment consists in rupturing it by means of the thumbs, so as to drive its contents into the cellular tissue, where they will be absorbed. A bandage should be put on for a few days. If the bag be so hard that it will not readily burst when pressed, it must be punctured with a needle. If the bag be so large as to make a swelling after its contents are let out, blisters and iodine ointment are proper.

GANGRENE.—This means literally to eat away, and is usually applied to the first stage of mortification, before the slough is formed.—See 'Mortification.'

GANGRENE, HOSPITAL.—Sometimes in crowded places, owing, it is supposed, to the impurity of the air, there is a strong tendency to gangrene. It is more common in crowded military hospitals after a severe battle than in civil ones.

GLAUCOMA.—In addition to what was observed regarding this disease in another place, we may make the following extract from Cooper:—"In glaucoma, the eye is green or yellowish-green, and if the eye be looked at laterally, no discoloration is seen. In cataract, the pupil is grey or greyish-white, and it has the same appearance in whatever

direction it is viewed. In glaucoma, the loss of vision is not in direct proportion to the change of colour in the pupil. With an inconsiderable change, vision may be entirely destroyed or seriously impaired; but in cataract, there is a direct proportion between the degree of opacity and the injury to sight. In cataract, vision is best in a weak light; in glaucoma, it is stronger in a powerful light, because, as the retina is less sensible, more light is required to make an impression on it."

GRANULATIONS.—When a wound does not heal by the first intention, as it is called, after some hours it becomes painful and inflamed. Serum is effused, owing to which there is swelling. Then a quantity of lymph is poured forth, which, about the third day, acquires a red colour, and bleeds when touched. Some days afterwards, it shoots up into granular projections, whence the name. These granulations are small, firm, pointed, and well supplied with bloodvessels and nerves. They are covered, too, with a fine pellicle, and excite pus. These go on forming until the space made by the breach of continuity is filled. The pellicle then hardens and forms a new skin, which is called the cicatrix.

GUMBOILS.—These generally arise from the irritation of an old stump of a tooth. They are best treated by warmth, puncture, and the removal of the cause.

GUMS, TUMOUR OF.—A common disease of the gums, is an excrescence that generally assumes a hard callous nature. Some of these are connected with the bone, and are of a malignant nature. Others are merely growths of mucous membrane; but as many tumours of the gums, trivial at first, become, if neglected, fatal diseases, the rule is, to extirpate them. "We see," wrote Sir Charles Bell, "a small tumour of the gum stationary for a long time, and claiming no attention, at last forcing its way into the bones of the face, filling up the cells and the cavities of the nose, pressing out the eyes, and rising at last upon the base of the brain itself." When this last catastrophe happens, the patient of course dies.

GUNSHOT WOUNDS.—Of all contused wounds, gunshot wounds, owing to the hardness of the body that produces them, and the velocity with which it is in general moving, are the most severe. The parts touched by the ball are generally of a blackish colour, owing to a slough being formed. This was formerly attributed to the ball having become heated by the gunpowder, and having, in consequence, burnt the part. Another peculiarity of gunshot wounds, is the very little bleeding that usually takes place from them, and this sometimes is the case when very large bloodvessels are wounded. And they are sometimes attended by very little pain. In all these respects, however, they vary, and, as Hennen remarks, "the effects of a gunshot wound differ

so materially in different men, and the appearances are so various, according to the nature of the part wounded, and the greater or less force with which it has been struck, that no invariable train of symptoms can be laid down as its necessary concomitants. If a musket or pistol ball has struck a fleshy part, without injuring any material bloodvessel, we see a hole about the size of, or smaller than, the bullet itself, with a more or less discoloured lip forced inwards, and if it has passed through the parts, we find an everted edge and a more ragged and larger orifice at the point of its exit. The hæmorrhage is in this case very slight, and the pain may be inconsiderable, inasmuch as that, in many instances, the wounded man is not aware of his having received any injury. If, however, the ball has torn a large vessel or nerve, the hæmorrhage will generally be profuse, or the pain of the wound severe, and the power of the part lost. Some men will have a limb carried off or shattered to pieces by a cannon ball, without exhibiting the slightest symptom of mental or corporeal agitation, nay, even without being conscious of the occurrence, and when they are, they will coolly argue on the probable result of the injury; while a deadly paleness, instant vomiting, profuse perspiration, and unnatural tremor will seize another on the receipt of a slight flesh wound. This tremor, which has been so much talked of, and which, to an inexperienced eye, is really terrifying, is soon relieved by a mouthful of wine or spirits, or by an opiate, but, above all, by the tenderness and sympathising manner of the surgeon, and his assurances of the patient's safety."

For a long time very erroneous opinions were held with regard to *wind contusions*, as they were called, *i. e.*, dreadful injuries produced without the skin being broken. It was thought that the air was put into such violent motion by the passage of the ball as to effect these. But it is quite certain that a cannon ball does no injury to any part that it does not touch. Nothing is more common than for soldiers or sailors to have pieces of their clothes or their hair shot away without receiving any other injury. One very remarkable accident of this nature occurred at Waterloo, where an officer had his ear shot away by a cannon ball, without the head being in the least injured. The injury in these supposed cases of wind contusions is, in fact, inflicted by the ball, which has struck the part in an oblique direction.

In the treatment of a gunshot wound, the best application at first is a pledget of lint, dipped in oil, and kept covered with cold, wet cloths. Should inflammation intervene, free dilatation should be made, and poultices applied. Afterwards, when the sloughs come away, pressure and stimulating lotions will be proper.

All question as to what kind of gunshot wounds require amputation would be out of place here.

HARELIP.—This consists in a fissure in the upper lip, either existing independently of other malformation, or complicated with malformation of the jaw and palate. In its simplest form, there is only one fissure, but sometimes there are two. The accompanying defect of the palate consists of a longitudinal split or division. The most frequent jaw malformation is a projection of that part of it which holds some of the teeth, which in consequence project.

All these put so many difficulties to deglutition and articulation, that it is important to remedy them by a surgical operation. It is not very safe, however, to perform this until the child is two or three years of age. When the jaw projects, pressure may be tried; and that failing, excision. The harelip is cured by making the surfaces raw, and then joining their edges together, keeping them close by means of silver pins, or common sewing needles. To relieve split palate, a silver plate may be worn in the mouth, so as to close the preternatural opening.

HEAD, INJURIES OF.—One very common effect of a severe injury to the head is concussion of the brain. In a very slight case of this, there is confusion of ideas and feebleness of circulation, both of which disappear in a few minutes; but when the violence has been more severe, there is complete insensibility, the pulse is very small, the breathing feeble, the pupils fixed, and often there is vomiting. This state lasts for from ten to twenty minutes, and then the patient either recovers, or inflammation of the brain comes on. If, however, there has been disorganization of the brain, the insensibility may last longer, and, indeed, may end in death.

The treatment of a person suffering from concussion, consists in keeping him warm, and, if necessary, in administering stimulants.

When the state of insensibility is recovered from, the patient in general feels so well, that he desires to go about his ordinary avocations. He is, however, in a state in which he is liable, from very slight causes, to take inflammation, and he ought to confine himself for some days to his room, and live low.

The symptoms of inflammation of the brain are, a quickened and sharp pulse, a hot and dry skin, headache, and peculiar susceptibility to light and noises. Then delirium and spasmodic contractions of the muscles come on, which may be followed by insensibility and death. During the latter part of such fatal cases, the pulse is usually slow, and there is often squinting.

The great point in the treatment is to begin an antiphlogistic plan early. Bleeding from the arm, followed by cupping on the back of the neck, shaving the hair, applying ice to the bare scalp, and the very free exhibition of drastic cathartics, are the remedies mainly to be trusted to.

Even after apparent recovery, the patient requires to take the greatest possible care, as the inflamma-

tion is apt to recur after exposure to sometimes very little excitement.

In some instances rigor suddenly comes on, and the patient gets quite insensible. In such a case, it may be inferred that suppuration has taken place; and the only chance (not a very strong one) of recovery, consists in perforating the skull with a trephine or circular saw, or with a trepan.

This operation of trepanning is also necessary in cases in which a portion of the skull is forced in, or in which there is, in consequence of violence, a large effusion of blood. A person suffering from either of these two conditions lies in a state of coma, breathing stertorously, his pulse slow, and his pupils not acted upon by light.

Sometimes, in cases of injury inflicted upon the cranium, the skull is split, without there being any displacement of the edges of the fracture. In themselves these fissures are innocent, and require no treatment; but they generally are a sign of very considerable violence, and probable danger from concussion, and consequent inflammation. If, however, along with fracture, there is depression, the depressed portion must be elevated by the trepan.

The scalp is also liable to injuries, although their effects are, of course, much less important. The common effect of violence applied to it is to cause effusion, generally almost immediately, into the cellular substance, which produces a firm round tumour. This usually spontaneously, or under very simple treatment, disappears.

A wound of the scalp should be carefully washed, the hairs around it shaved away, and an attempt made to heal it by the first intention.

HERNIA, or Rupture.—When a portion of any of the abdominal viscera is protruded through the parietes of its containing cavity, the skin being unbroken, a hernia or rupture is produced. This displacement takes place at various parts of the abdomen. Hernia is generally produced by some violent exertion or strain. It is known to exist, when there is a tumour that disappears on lying down, that can be returned by the hand, and which is increased by coughing. A hernia in this state, however, is called a reducible hernia; and as long as it remains such, is a very harmless affair. Unfortunately, it is liable at any moment to be converted into an irreducible one—a very dangerous and fatal disease.

The treatment, then, of a reducible hernia, consists in taking measures that it do not become irreducible. This is effectually done by keeping the viscera in the abdomen by means of a truss. Any one affected with hernia, and who has on a properly-adjusted truss, is as safe as if he had no hernia; while one going about with an unprotected hernia is in constant danger of a disease that will probably end in death, and which, if recovered from, is generally only so at the expense of a very painful and very dangerous operation.

When a hernia gets into that state that it cannot be returned into the abdomen, it is said to be strangulated. The symptoms of strangulation are—besides, of course, the very obvious one of the tumour—a burning and severe pain, referred to the umbilicus or navel, and violent sickness and nausea; the countenance of the suffering man is pale, collapsed, and anxious; the pulse is small, and the extremities cold. The strangulated part is, in fact, in a state of acute inflammation, which, if not relieved, is sure to soon prove fatal, mortification invariably coming on.

The treating consists, in endeavouring to reduce it by grasping it at its neck, compressing it between the finger and thumb, and then attempting to press it gently into the abdominal cavity. Should the tumour not yield to this, the muscles of the abdomen may be tried to be semiparalyzed by bleeding, warm baths, the application of cold, and the exhibition of tobacco. All these, however, too often fail; and the only resource is then an operation that can only be performed by a surgeon.

HIP DISEASE, or Morbus Coxarius.—This prevails in cold, moist climates, and generally on children between the ages of seven and fourteen. The symptom first noticed is usually pain in the knee, which is often complained of for a very long time before the real nature of the disease is suspected. The first indication, indeed, of the seat of the affection being in the thigh, is a difficulty of walking; and, upon examination, it is ascertained that the thigh is emaciated and lengthened, that the convexity of the hip is diminished, and that, on standing, the foot is advanced before the other, and the patient may be observed not to rest his weight upon it. Pain is then noticed in the hip-joint itself, and it comes on in paroxysms, without any assignable cause, particularly at night, and during damp weather. This state of matters may continue a long time, and spontaneous cure either takes place, or a new set of symptoms make their appearance.

When this latter is the case, the affected limb becomes shorter than the other one, and turned either somewhat in or out, and the power of motion in it is much impaired. Large collections of matter take place about the joint, which burst at various parts, and continue discharging for a long time. In some instances the affected person takes hectic, and wastes away, or he recovers with an anchylosis formed at the hip-joint, and a wasted limb.

The disease consists in chronic, often scrofulous inflammation of the bones of the joint. The treatment consists in long-continued counter-irritation, a tonic regimen, the administration of iodine, &c., and in rest. The disease is almost always fatal when it occurs in adults.

HORDEOLUM, or Stye.—This is a little tumour on the eyelid, thought to resemble a barley-corn, and hence termed hordeolum. It is a boil upon the

eyelid, where, at least in irritable constitutions, it excites a good deal of pain and inflammation. It is best treated at first by poultices, and then by stimulating lotions.

HYPOPIUM.—This is the name given to the accumulation of a purulent fluid in the anterior chamber, and is the consequence of inflammation of the iris.—See 'Iritis.'

INCARCERATION.—An irreducible hernia is said to be incarcerated.

INTESTINES, WOUNDS OF.—In treating a simple penetrating wound of the abdomen, any intestine that may be protruded should be gently pushed back, the edges of the wound then stitched together, the sufferer placed in bed, and put upon a strictly antiphlogistic plan. If signs of inflammation make their appearance, venesection, leeching, warm fomentations, and opium, should be all called into requisition; and where there is any tendency to sink, stimulants.

If, however, besides protruding, the intestine be wounded, the very worst results may be anticipated, owing to the escape of the contents of the intestine to the peritoneum, where they excite inflammation that is usually fatal. Still, an attempt to save the patient must be made, and the free exhibition of opium is perhaps the most likely to be of use.

INTROSUSCEPTION.—This expression means that one portion of the intestines has passed into another.

IRIS, PROTRUSION OF.—If an opening is made into the cornea, whether from ulceration or mechanical violence, the iris is apt to protrude. The portion of the iris that does so protrude, forms a dark-coloured round tumour that excites great irritation. The treatment consists in rubbing it with lunar caustic.

IRITIS.—"The symptoms of iritis are—severe, deep-seated pains in the eye, extending into the forehead, with more or less of fever, according to the intensity of the local affections; the iris changes its colour, usually acquiring a dull brick-red hue in part of its extent; the pupil is generally small, fixed, and irregular; the aqueous humour appears turbid; and there is a distinct red zone formed by the enlarged vessels of the sclerotic, at the distance of about a line from its connection with the cornea. The consequences of this inflammation are—effusion of lymph on either surface of the iris, which, becoming organized, may cause permanent obliteration of the pupil, and adhesion of the iris to the capsule of the lens of the cornea."*

Iritis generally occurs in individuals of an unsound constitution, and the disposition to it certainly sometimes seems to be excited by taking a large quantity of mercury. It also comes on from extension of the inflammation in cases of inflamed sclerotic.

Iritis will not, at least usually, get well under ordinary antiphlogistic treatment, and in particular

* Syme.

this will not stop the deposition of the lymph, upon which a great part of the evil consequences of the disease depend. The remedy, *par excellence*, in iritis, is calomel, rapidly administered, so as to affect the mouth. And when this is effected, the lymph that has been effused often disappears, as it were, by magic. The patient should first be bled, and then take two grains of calomel, combined with a little opium, every four or six hours, until the gums are sore. Sometimes the disease is, from the first, of a chronic nature, and for the bleeding we may substitute blisters applied behind the ears.

ISSUE.—This is an ulcer made designedly by the practitioner, and purposely kept in a state of suppuration. It is one of the best means of keeping up counter-irritation that we possess. There are two ways of making it, one with a knife, and the other by the application of caustic. If a knife—and small issues are now generally made with the knife—a fold of the skin, in the place where the issue is intended to be, is held between the finger and thumb, and a slit made big enough to hold one or more peas. The pea or peas are then placed in the wound, and covered with a piece of plaster. In two or three days, matter will begin to discharge, and by taking out the peas every day and putting in other ones, a constant secretion of pus is kept up.

A larger issue is commonly made with caustic, the caustic potassa being generally employed. To make this, a hole is cut in a piece of diachylon plaster, the size of the intended issue, and put upon the part to which the caustic is to be applied. This is to protect the surrounding skin. The caustic, held in a piece of tow, and its end dipped in water, is then rubbed upon the skin until discoloration is produced. A poultice is then applied, and renewed from time to time, until the slough come out. The ulcer thus formed is dressed every day, one or more peas being put into it.

Issues should always be made in those parts of the body where the peas will not be disturbed by the ordinary motion of the body. The common places where they are put in, are the arm, the leg, and the back of the neck.

JOINTS, DISEASES OF.—Joints are exposed both to sprains and bruises, the former being a straining or overstretching of their ligaments. Both are attended with severe pain, which generally induces sickness and loss of motion. Soon after their infliction, swelling, tension, and, particularly in scrofulous constitutions, decided inflammation comes on. The inflammation is generally of a chronic form, and may induce lameness, by producing thickening and degeneration of the articulations.

The treatment of recent sprains and bruises about joints consists in perfect rest, and the application of hot fomentations. If inflammation comes on, blood must be abstracted, and when it gets into a chronic state, counter-irritation freely used.

When the violence is so great as to displace the surface of an articulation, a dislocation is produced.—See 'Dislocation.'

Sometimes, in consequence of exposure to cold, joints become inflamed. This is indicated by deep-seated pain, aggravated by motion and pressure, and very often accompanied by swelling of the integuments. It demands, of course, antiphlogistic treatment.

The knee-joint, too, is liable to dropsy. In healthy individuals this is generally the consequence of direct and violent injury, such as fracture of the lower part of the thigh-bone, or of the patella, or a very serious strain; but in weak and irritable constitutions, this disease is sometimes induced by very trivial twists, and sometimes even from mere exposure to cold. The effusion very rapidly comes on after the exciting cause has been applied, and there is some accompanying inflammation. The fluid can be easily felt and made to fluctuate, and the patella may be felt as it were floating in it. The treatment consists, as long as there is any inflammation present, in leeching and fomenting, or applying evaporating lotions, and when the inflammation has subsided, in repeated blistering and bandaging.

Another disease to which joints are liable, consists in the formation in them of small movable cartilages. Fortunately these are of rare occurrence. They may remain quiescent for a long time, but the moment they get between the opposite articulating surface, they excite great pain, and completely hinder all motion in the affected joint. The only cure is excision, but this operation is a very dangerous one, and should only be had recourse to in very serious cases.

The name of white swelling is given to an affection, or rather to three different affections of the joints, that occur in scrofulous subjects. One of these is gelatinous degeneration of the synovial membrane, and consists in a change of its natural structure into a soft, greyish-yellow, gelatinous mass. The first symptoms of this disease are, a soft, elastic, colourless swelling, and diminished mobility. The pain is trifling. In some cases, the morbid matter is absorbed, and the joint gets comparatively well, although there is always more or less swelling and stiffness. In other instances, however, the ending may not be so fortunate, and suppuration may come on, the pus being discharged through openings that are formed in the joint, and the patient, if he escape dying from exhaustion and lætic, has a completely ankylosed joint.

The treatment of this affection consists in preventing inflammation, by enforcing the strictest rest, and for this purpose the diseased limb should be bound up with splints. If attacks of inflammation come on, leeching and fomentation should be employed; and when these have subsided, absorption should be promoted by blistering, the use of iodine, and

moderate pressure. When suppuration comes on, stimulating washes should be applied, and the patient's strength carefully kept up.

The second morbid action in the joints that goes by the popular name of white swelling, consists in ulceration of the cartilages. This takes place in scrofulous people, and still more frequently in those who have suffered from rheumatism. The exciting cause, however, is generally some sprain. The disease is attended with deep-seated, gnawing pain, that is most troublesome at night, and by-and-by with swelling. It may end in resolution, although there is always a certain degree of stiffness left; or it may suppurate. The treatment consists in rest, counter-irritation, the administration of iodine, &c.

The third cause of white swelling is suppuration of the heads of bones.

KERATONYXIS.—This is the technical expression for couching through the cornea.—See 'Cataract.'

KNEE.—See 'Dislocation,' 'Fractures,' 'Joints,' &c.

LACHRYMAL ORGANS, DISEASES OF.—See 'Fistula Lachrymalis.'

LARYNGOTOMY and TRACHEOTOMY are the names of operations that have for their object the admission of air into the lungs, when the natural passage is obstructed; or the extraction of foreign bodies.

Foreign bodies are very rarely admitted through the chink of the glottis; but when they are, almost always produce very dangerous and distressing symptoms, usually of an immediate nature. The accident generally occurs in children who have been playing with something in their mouth. Usually most violent cough is induced, which may eject the body, but which, from the immense quantity of mucus that is excited, and the impediment put to inspiration, threatens instant suffocation. In such a case, an opening should be made into the trachea, and the foreign body extracted. The diseases that obstruct the natural passage are, croup, œdema of the glottis, and ulceration of the larynx. In croup, the false membrane generally extends so far down, that even the operation gives no relief; and the two diseases are not common. The presence of a small quantity of foreign matter may also bring on spasm of the larynx, as occurred in the case immediately to be quoted:—

"Martha Campbell, aged seventeen, a servant, was admitted into ward No. 3, of the Surgical Hospital, on 4th June, at half-past 11 P.M.

"It was stated by those who accompanied her to the house, that, an hour and a half previously, some sand had been thrown into her mouth by a boy, while she was in the act of inspiring. Water was procured for her, with which to rinse her mouth; but she had only time to do this once or twice, when she was seized with a severe fit of coughing and difficulty of breathing; and the latter, which was from the first characterized by paroxysmal

exacerbation, was gradually becoming more and more urgent.

"I may here observe that the patient afterwards stated, that before admission she had coughed up several particles of sand.

"On admission, she was suffering from severe dyspnea, aggravated in paroxysms which recurred frequently. In the intervals between the paroxysms, inspiration was prolonged, and marked by a crowing sound, and expiration was attended with a harsh crowing noise. The voice was very weak, and the cough had a peculiar prolonged character. The face was becoming livid, and the pulse was very rapid, small, and weak. The epiglottis was carefully examined, and found to be perfectly natural, and free from any particles of sand. The patient anxiously besought relief from what seemed to her impending suffocation.

"As tracheotomy appeared to me to afford the only chance of preserving the patient's life, the operation was immediately performed, and a middle-sized tube was inserted into the trachea. Immediate relief was experienced by the patient, and she soon afterwards fell into a quiet sleep. Before the introduction of the tracheotomy tube, two or three particles of sand were discharged from the opening in the windpipe.

"She afterwards took an attack of rheumatism, but was dismissed cured in the beginning of August."*

LEUCOMA.—When an ulcer on the cornea has cicatrized, it constitutes a leucoma. These specks are difficult to remove, and are best treated with a solution of nitrate of silver, or other stimulants.

LIGATURE.—A ligature is a piece of cord used to tie round an artery to stop the flow of blood through it. Ligatures are now always made very fine, and generally of silk twist.

LIP, CANCER OF.—The under lip not unfrequently becomes affected with cancer. This disease rarely makes its appearance before middle life, and is most common in the male sex. It sometimes begins as a hard scirrhus, but at other times its first indication is a chap, or crack. When the cancer is fairly formed, it is accompanied by the usual severe lancinating pain of cancer, and the edges of the sore are remarkably hard, and it yields to no treatment, and must therefore be excised.

It is of importance, however, to know that ulcers are very apt to occur upon both lips, which are very difficult to cure, and which depend upon morbid conditions of the digestive organs; therefore, an obstinate sore upon the lips should always be treated for some time, to see if it will heal. The treatment consists in endeavouring to restore the tone of the digestive organs, and in using locally stimulating applications.

LIPPITUDO.—Sometimes the eyelids get into a chronic morbid state, and secrete a quantity of mucus,

* Dr. Fleming.

which, during sleep, fastens the eyelids to one another, and the edges of them become red, and affected with chronic inflammation. The best application is dilute citron ointment.

LITHOTOMY.—The operation of cutting a calculus out of the bladder.—See 'Urinary Calculi.'

LITHOTRITY.—The operation of breaking up a calculus in the bladder.

LUMBAR ABSCESS.—This signifies a collection of matter which forms in the cellular tissue of the loins, behind the peritoneum, and descends in the course of the psoas muscle. From the last circumstance, it is often called psoas abscess. It occurs most frequently in scrofulous people. Those affected by it in the early part of the disease cannot walk so well as usual, and have uneasiness in the loins, but little or no acute pain, the malady being essentially a chronic one. As the disease advances, however, there is more pain felt, and the difficulty of walking increases. Sometimes the lumbar abscess is connected with a diseased condition of some of the vertebrae. The abscess at length generally points at the groin, and when it has once burst, the discharge is very apt to go on until fatal hectic supervenes. The treatment consists in keeping up the strength, and if the vertebrae are affected, using counter-irritation.—See 'Spine, Diseases of.'

LUXATION.—A dislocation.

MAMMÆ, DISEASES OF.—The female breast is liable to a great many diseases, all of which have been divided† into four classes. 1. Those in which there is excitement of its nutritive and sentient functions, as indicated by enlargement, hardness, and pain; 2. those in which there is a collection of purulent matter; 3. in which there is a morbid growth, limited to the nature of the texture in which it originates; and 4. in which there is a malignant growth that tends to form incurable ulcers, and to taint the whole constitution.

In the first division are included indurated and irritable breasts, as they are often termed; in the second, milk abscess, and chronic abscess; in the third, sarcomatous, fibrous, and cystic tumour; and in the fourth, cancer.

Particularly in young and robust women, but also at all ages, the breast is liable to a hard and painful, but temporary swelling. But although these often excite great apprehension, they generally yield to fomentations and a little time. The more lasting indurations that sometimes follow internal injuries, are distinguished from the early stages of malignant tumours, by not presenting the very hard feel, by the pain not being lancinating, and also by its varying very much in intensity at different times of the day, or in different days, and, above all, by yielding to leeching, fomentation, and attention to the general health, which in all these cases is generally affected.

† Syme.

The irritable breast, as it has been termed, is an exaggeration of this latter. It is met with in nervous, weakly, and irritable women, who have been suffering for a length of time from depressing mental passions, and is a form of neuralgia. The pain is described as very severe and violent. No hardness, at least of any considerable degree, is to be felt. The treatment is the same as that for neuralgia—the administration of iron and valerian, with a tonic regimen, bathing, sea air, &c. The breast should not be amputated, as, if this course is followed, the chances are that the scar will be as painful as the breast was.

Milk abscess comes on, as its name implies, during nursing. It is preceded by shivering and general fever, then the local inflammation develops itself, and ends in suppuration. At first, leeches and fomentations should be tried, with a view of obtaining resolution, but if matter is evidently going to form, poultices should be applied, and when the pus points, an incision should be made to let it out. If one or more sinuses are left, they will disappear if the mouths of the more depending ones are moderately enlarged.

The chronic abscess comes on more insidiously, and there is no preceding fever, nor accompanying inflammation. A deeply-seated abscess without much pain is formed. It is distinguished from more serious disease by being fluid and fluctuating. The treatment consists in evacuating its contents, and then applying poultices.

The breast sometimes becomes simply hypertrophied, in which case iodine and pressure should be tried. A fibrous sarcoma, i.e., a fibrous cartilaginous structure, sometimes forms in the breast. It excites little or no pain, and should be let alone. The same may be said of the deposition of cyst, either of a simple nature, or containing hydatids.

All these diseases of the breast are comparatively harmless, when contrasted with carcinoma. Of all organs in the body, the breast is the most disposed to have this malignant matter deposited within it. It occurs at all ages, but is most common in mid-life. Sometimes it is preceded by a blow or other injury, but we can only regard such as an accidentally exciting cause. Its deposition certainly seems to be favoured by the depressing passions, particularly when they are of long continuance.

Scirrhus in the breast is known by its extreme hardness and unequal surface. The integuments are generally puckered, and drawn towards it, and the nipple is depressed. The general health is almost always affected, and there is often a peculiar hue of the countenance. Occasional pains lancinating through the tumour are complained of, which increase in intensity. If the complaint be allowed to remain, the part bursts, discharges a kind of matter, forming incurable ulcers or cancer, and the glands in the armpit become affected. The pain

becomes very great, and lancinating pains are felt through the whole body; and, after varying periods, death comes on, partly owing to the exhaustion from the pain and discharge, but partly from some depressing effect that the matter of cancer would seem to have upon the system.

The palliative treatment of scirrhus consists in keeping down local inflammation by means of leeching and fomentations, and in endeavouring to make the general health as good as possible. The pain of cancer may be relieved by the external application of hemlock poultices, &c., and the internal administration of it, and other sedatives. But the only effectual treatment is extirpation, before the system has become affected by the matter having been taken up by the absorbents.

A scirrhus in an aged person is very little apt to become converted into a cancer, and therefore an operation in such an individual is scarcely warrantable.

MOLLITIES OSSIUM.—*Softening of the Bones.*—This is a very remarkable disease. It consists in an extraordinary softness of the bones, dependent probably upon a deficiency of phosphate of lime, which is confined, or nearly confined, to middle-aged females, and is fortunately very rare. The most wonderful case of this kind is probably that of Madame Supiot. She had a fall which confined her to bed for some time, and left great weakness in her lower extremities, and in about a year and a half she began to feel her left leg particularly affected. Along with this she had pains all over her body. After these had lasted some time, she noticed that her limbs began to bend, and their softness increased from that time up to her death. At last her thigh bones became so flexible, that her feet could be laid on each side of her head.

Nothing is known regarding the treatment of this disease. For a peculiar and temporary softness of the bones of children, see 'Rickets.'

MORTIFICATION.—The following is an abstract of a very eminent surgeon's account of mortification, and may serve as a supplemental account to that given in the "Medical Guide."

The symptoms that precede mortification are generally those indications of intense inflammation. As the mortification approaches, the skin acquires a yellow hue, and exhibits dark spots or lines. Then the temperature lowers, and vesicles containing a thin serum of various hues form. This state constitutes gangrene, and may be partially or entirely recovered from. If neither of these takes place, the part loses all sensation, shrinks, becomes very dark coloured, and emits a disagreeable smell. It now constitutes a slough.

If the local part thus affected be of any considerable extent, the constitution becomes affected. The countenance is pale, cold, and damp; the features appear as if contracted; the pulse is quick, feeble,

and irregular, and the tongue brown. The sufferer lies in a state of collapse, hiccuping, and vomiting a fluid that resembles coffee grounds, and he is usually in a state of low muttering delirium.

The causes of mortification are stated by this surgeon to be weakness, irritability, a disposition to act, or irritation on being excessively acted upon. The treatment consists in preventing the causes, and therefore may, at different times, require the most opposite plans.

MUSCLES.—Muscles are liable to accidents which require the interference of the surgeon. The most common of these are wounds. A clear incised wound in one is of little consequence, as in ordinary cases it heals up without much trouble. If the wound be across the fibres, they contract, and it is some time before the muscle returns to its former powers and capabilities. In such cases the patient should be made to assume such a position as to have the injured muscle as little extended as possible.

Muscles, too, are liable to sprains—see ‘Sprains’—and, but rarely, to rupture, from over-exertion. The treatment of these ruptures consists in repose and warm fomentations, and, subsequently, the application of stimulating liniments.

NEBULA.—This is the name given to an effusion of lymph between the conjunctiva and the cornea, caused by inflammation. It causes, of course, more or less opacity. It is best treated by the application of opium, wine, or solution of nitrate of silver.

NECROSIS.—This word strictly means mortification, but it is limited by surgeons to mortification of the bones. Formerly, necrosis and caries (see ‘Caries’) were confounded together, but they are very different, caries being an ulcer going on in a bone, while necrosis implies a bone completely dead, which requires to be separated from the body, in order that new bone may take its place.

The bones most liable to this mortification are those of the thigh, the shin, the collar-bone, the lower jaw, the arm-bone, and those of the fore-arm. Children and young people are the most liable to it. The cause of it is previous inflammation.

Necrosis may very conveniently be divided into three stages. In the first, the bone dies; in the second, the dead bone separates from the body, or, to use the technical term, exfoliates; and, in the third, the separation is complete.

The part in which a necrosis is going to occur swells. If, as sometimes happens, the swelling come on gradually, the pain is of a dull nature, and not very great; but if the swelling suddenly form, the pain is usually very excessive. After a time a quantity of pus is formed, and the abscess bursts. The formation and discharge of pus still goes on, and the sinuses through which it escapes acquire hardened edges, and are, in fact, fistules. The reason of all this is, that there are some pieces

of dead bone, either loose or detached, which keep up a constant irritation.

These symptoms, however, do not entitle us to pronounce a swelling and abscess about a bone a case of necrosis; mortified or necrosed bone has a very different appearance and texture from a living sound one. It appears as if macerated, is white, and hard and sonorous when touched with a probe. A probe, then, introduced through one of these sinuses, informs the surgeon of the nature of the affection.

It is also possible, as it is important, to ascertain the advance the disease has made, and the probe informs the surgeon whether the bone is loose, very loose, or altogether detached. When this last is the case, it is called, in the language of the schools, an exfoliation. These exfoliations may linger for a long time in the sinuses, and prove a source of great irritation.

The treatment of necrosis consists in keeping up the patient's strength, opening the abscesses when they point, and giving a little assistance to the escape from the sore of the exfoliations.

But the most remarkable thing attending necrosis is, that the dead bone is reproduced, or, at any rate, that a new bone is formed of the same shape, size, and uses as the old one. A very remarkable case of this was long ago narrated by Dr. M'Kenzie: “A boy, thirteen years old, received a blow on his thigh at school, of which he at first hardly complained, but in a few months he began to have pain in the part, which inflamed, swelled, and seemed to have matter in it. The parents being poor, no surgeon was called, and the boy was allowed to linger for a great while. At length the matter made its way through the skin by a small opening on the interior side of the thigh, about three inches above the knee, and a thin sanies continued to be discharged for eighteen or twenty months. The hole in the skin enlarged, and the point of a portion of bone began to protrude, and give a good deal of pain when the clothes rubbed against it. After suffering in this manner for two years and a half, the boy, as he lay in bed one morning, felt the bone looser, and projecting more than ordinary. He gave it a strong pull, and brought the piece away entirely, which proved to be seven inches and a half of the thigh bone. A good deal of bleeding followed, but the wound soon healed, and he had never afterwards the least inconvenience. Dr. M'Kenzie hearing of this case, sent for him, carefully examined his thigh, and found it as firm as the other; the only difference was, that it was somewhat thicker, and a little more curved. The muscles retained their usual softness and looseness on the bone. The detached piece of bone was a portion of its whole circumference.”—(COOPER.)

All the aid required, or, indeed, that the surgeon

can give, to this restorative process, is to keep up the strength of the patient.

NEUROMA.—This is the name given to a tumour upon or in a nervous trunk. Neuroma is a rare disease, and when it does occur, it occurs most frequently in the upper extremity, and, from pressing upon the nerve, gives much pain. The treatment consists in cutting it out. More frequently, the end of nerves that have been divided in an amputation swell into bulbs, which are often very painful.—See 'Stump.'

NIPPLE-SORE.—The nipples of a nurse are apt to become inflamed and sore. In this case, she cannot allow the child to suck, and the milk accumulates and excites inflammation. The milk should be artificially extracted by means of a cupping-glass, and some stimulating application made to the nipple. A solution of borax is a very common one, but perhaps gently touching with nitrate of silver is the most effectual.

NODE.—A chronic swelling and inflammation of a portion of the periosteum.

NOSE, FOREIGN BODIES IN.—Children often stick small bodies into their nostrils, where they sometimes, owing to their exciting inflammatory swelling, get impaled. This inflammation may get into a chronic form, and be mistaken for idiopathic inflammation. The foreign bodies should be searched for, and extracted with a pair of forceps.

NOSE, HYPERTROPHY OF.—The skin and adjacent cellular tissue of the nose are liable to become occasionally very much enlarged. At an early stage of the hypertrophy, it simply presents a warty appearance, but, when more developed, it constitutes large pendulous masses that are very ugly, and often inconvenient. The treatment consists in excision.

NOSE, POLYPUS OF.—Three kinds of polypi grow from the nose. The most frequent of them is the Mucous Polypus. This grows from the mucous membrane of the upper part, is of a tough consistence and little sensibility. It commonly comes on about middle age, and goes on growing until it, or they—for usually more than one appear at once—fill the cavity of the nostril. The treatment consists in removing them, the best plan being to tear them out by forceps.

The Bleeding, or Malignant Polypus, is of a more serious nature. It consists of a foreign body, generally of a soft nature, and always very ready to bleed from the slightest injury, and which is attended with pain, and a purulent and fetid discharge. It tends to go on increasing after it has filled up the cavity of a nostril, and hence to press upon and separate the bones of the face. The treatment of this consists in keeping it under by means of scissors, &c., and then stopping the bleeding by the application of cold and astringent washes.

The Fibrous Polypus, as it is called, is distinguished by the extreme firmness of its texture. It, like the last, bleeds profusely when injured, and increases without any limit, its increase ultimately proving fatal. The only chance of recovery from it seems to lie in incision.

CEDEMA.—This is a swelling arising from the effusion of serous fluid into the cellular tissue, and is a very common occurrence in surgery, particularly after external injuries.

CESOPHAGOTOMY.—This is the name given to cutting into the œsophagus, in order to take out any foreign body that has stuck there, and which cannot be pushed down into the stomach nor extracted by the mouth. A substance beyond a certain size, that has got fastened into the œsophagus, not only hinders deglutition, but, from pressing upon the trachea, renders suffocation imminent. Accordingly, when such is the case, and when the foreign body can be felt by the finger or a probang, the severe operation of cutting into the œsophagus is considered permissible. It is a very dangerous operation, and very seldom had recourse to.

CESOPHAGUS, FOREIGN BODIES IN.—Pieces of meat, fish bones, pins, and the like, are occasionally swallowed, and, from their size or the sharpness of their points, get impaled into the œsophagus. When this latter is the case, the foreign bodies usually get fast pretty high up.

When the obstructing body is a piece of meat, or other digestible matter, the best plan is to push it down into the stomach by means of a probang. If it be a pin or the like, particularly if it be stuck high up, it is best to remove it by the fingers or a pair of forceps. It is important to know that, long after such has passed into the stomach, the irritation that it produced where it stuck is so great, as to give the idea of its being still present, long after it has passed away.

In the absence of a probang in the case of impaled pieces of meat and the like, vomiting may be excited by irritating the fauces with a feather.

CESOPHAGUS, STRICTURE OF.—Two kinds of stricture occur in the œsophagus, one merely spasmodic in its nature, the other organic.

Spasmodic stricture occurs in nervous people, and in paroxysms, and belongs to the physician. Organic stricture is a surgical disease.

The organic stricture is of two kinds. The one, which is sometimes called simple organic stricture, is a small ring of contracted matter, which sometimes, however, renders the diameter so small, that a common quill, or even a less object, cannot pass through. It may be produced by swallowing any of the strong mineral acids, but it usually, when it does occur, comes on in middle life, without any assignable cause. It makes its appearance by very slow degrees; at first the swallowing of large

morsels is felt to be difficult, then impossible; then the stricture becomes more compressed, and even small solid articles of food cannot be got down, and at last the general health begins to fall off, from an inability to take a sufficient quantity of food. The nature of the disease is discovered by passing a bougie into the œsophagus, and finding an impediment to its passage.

The treatment of this form consists in finding a bougie that will pass, and in daily dilating the stricture by means of larger and larger ones.

The other kind of organic stricture is produced by malignant cancerous deposits, and no treatment can be of the slightest efficacy.

ONYCHIA.—See 'Whitlow.'

OPHTHALMIA.—This is the general name for an inflammation of the eye. Acute ophthalmia, when severe, and particularly when the internal textures of the eye are affected, excites very great constitutional disturbance, a great amount of general fever being set up. There is great pain, redness, and swelling in the affected organ, intolerance of light, and discharge of tears. If the case be not checked, the pain becomes still greater, and throbbing rigors take place, and the eye bursts, discharging pus—vision, of course, being altogether lost in the organ.

The causes of ophthalmia are, external violence, exposure to light, &c. For its treatment, see 'Conjunctiva,' 'Iritis,' &c., &c.

OPHTHALMIA, PURULENT.—This is a peculiar form of ophthalmia, characterized by the tendency to effuse pus, and of a chronic nature. It is very apt to prove very destructive to vision, by causing ulcerations and opacities. It is most frequent in young children. Whenever it gets into a chronic state, solution of nitrate of silver or opium wine should be applied.

ORBIT, TUMOURS OF.—A variety of tumours occasionally grow in the orbit, and, if they get of considerable size, push the eye to one side, and may destroy vision. The treatment consists in excision.

OSTEO-SARCOMA.—All solid tumours of bone, the density of which is not so great as that of bone, are called *osteo-sarcoma*, a word that literally means bone and flesh. "It consists," says Mayo, "in a growth of substance nearly resembling epiphyseal cartilage in texture, originating either upon the surface, or in the cancelli of bones. The form of the tumour is commonly more or less spherical; it may attain so great a volume as to be nearly a foot in diameter. When an osteo-sarcoma is small, the surface, displayed by a section, is tolerably uniform, or differs only from the most transparent cartilage in exhibiting minute, oblong, or irregular cavities. When an osteo-sarcoma is large, cavities of considerable size are found in it, which contain a reddish fluid. In parts, the texture grates when cut, and contains phosphate of lime.

This is distributed so as to form a kind of skeleton of light bony plates, disposed in a manner that looks like a crystallization. The growth of such a tumour is commonly rapid. When it begins in the interior of bones, the disease is attended with pain; when it forms on the outer surface, there is commonly no pain at all. As osteo-sarcoma has to the touch the firmness and elasticity of cartilage, this disease is ordinarily met with in the bones of the extremities, and in the lower and upper jaw. The cranial bones are less frequently, if ever, attacked by it. The disease does not, that I know of, attack any other texture than bone. It bears, however, some external resemblance to gelatinous cancer of other parts. It has not much malignity, so that, when all the bones involved in it, with part of the adjacent sound bone, are removed by amputation, the complaint seldom reappears either in the part or in another bone. If the part is not amputated, the skin over the tumour sloughs or ulcerates, the tumour is exposed, and a discharge, sanious or ulcerous, takes place from it, under which the patient gradually sinks."

OZENA.—This is an ulcer situated in the nose, sometimes connected with caries of the bones, and always accompanied by a fetid discharge. It is usually connected with a deranged state of the health, produced by taking a large quantity of mercury. The general treatment of it consists in administering tonics and alteratives, and the local, in applying stimulating washes.

PARACENTESIS.—This is the name given to the operation of tapping a cavity containing fluid, but is most commonly applied to tapping the abdomen in cases of dropsy.

PARONYCHIA.—See 'Whitlow.'

PARULIS.—A gumboil.

PERIOSTITIS.—The periosteum is occasionally inflamed, that lying over bones near the surface being most liable to become thus affected. The inflammation is characterized by dull aching pains, slight swelling, and redness of the adjoining integuments. The pain is usually worse at night, and also after taking food. The treatment consists in applying leeches and hot fomentations, and afterwards counter-irritants, and in the internal administration of opium, colchicum, and alteratives.

PERNIO.—An old technical name for chilblain.

PHAGEDENIC ULCER.—One that spreads and tends to gangrene.

PHLEBITIS.—Inflammation of a vein.—See 'Veins.'

PHLEBOTOMY.—See 'Venesection.'

PHLEGMASIA DOLENS.—A swelling of the legs, owing to obstruction of the circulation from inflammation of the crural veins.—See 'Veins.'

PILES, or *Hæmorrhoids*.—These sometimes consist of a varicose condition of the hæmorrhoidal veins, but more frequently are morbid growths upon

the mucous membrane. Both kinds take occasional fits of irritability, when they become very painful. These fits are induced by anything that deranges the system, the most common causes being, probably, a fit of indigestion and exposure to wet. Another very common one is unusual fatigue. They are best relieved by astringent applications and the administration of laxatives. They often appear to act as a useful counter-irritant; and their disappearance, when they have been of long standing, is sometimes the precursor of apoplexy. Many surgeons believe, also, that their presence retards the progress of phthisis.

POLYPUS.—See 'Nose, Polypi of.'

PROBANG.—A long slender piece of whalebone, with a bit of sponge at its extremity, intended for pushing matters that are stuck in the œsophagus.

PTERIGIUM.—This is the name of the reddish preternatural membrane that sometimes begins to grow at the internal angle of the eye, and gradually extending, at last obstructs the cornea. It is represented in fig. 6, Plate XXIII. It is an occasional result of inflammation of the conjunctiva, and is most prevalent in warm climates. Stimulating lotions may be applied to it, and these failing, it must be cut away.

PUPIL.—When the opening in the centre of the iris is preternaturally large, and the iris more or less deprived of the power of motion, we have mydriasis, or dilated pupil. This is a symptom of a great many diseases of the brain. But it also occurs as an idiopathic affection, and it is also said to be produced by living much in the dark. When the retina is sensible, this preternatural enlargement of the pupil, by admitting too much light, may produce great inconvenience. The treatment of this affection consists, when it is symptomatic, in removing the cause, and if it depend upon paralysis of the iris, blisters may be applied over the temples.

An opposite condition to this preternatural dilatation of the pupil, is termed myosis. It occurs as symptomatic in various head affections, and is sometimes acquired by habit in watchmakers and others who are obliged to look intently at minute and shining objects. In this case it becomes a serious inconvenience, and a person so affected can scarcely, except in bright light, see objects at all, and, what is worse, the habit, when once formed, is very incurable.

Occasionally, in consequence of iritis, or other deep-seated inflammation of the eye, the pupil becomes closed, and in an eye thus affected, it is needless to say that vision is impossible. In such a state, provided the retina be sound, a considerable power of vision may be regained by forming an artificial pupil. This may be done by cutting a piece out of the iris, and in other manners. It is, however, a dangerous operation, owing to a certain amount of iritis being necessarily set up by it, and

therefore, if there is any power of vision in the eye, it is not allowable, as it may produce complete blindness. For the same reason, if the patient can see with one eye, the other should not be interfered with.

PUS.—See 'Suppuration.'

RACHITIS.—See 'Rickets.'

RANULA.—This is the diminutive of *rana*, a frog, and is the name given to a tumour under the tongue, from a fanciful notion that any one affected by it croaked like that animal. It is usually described as an obstruction of the submaxillary duct, but would appear to be an encysted tumour. If it acquire a certain size, it pushes the tongue backwards, even displaces the teeth, affects the voice, mastication, and swallowing, and in infants opposes sucking. Indeed, it may grow to such an extent as to be a fearful deformity. The treatment consists in cutting out an oval piece of it, and filling the cavity with lint, or touching it with caustic. This is done to make it suppurate and granulate. Sometimes, however, excision is necessary, as in the following case, which occurred to Boind. In this, the swelling not only filled the mouth, but one-half of the tumour projected out of it:—"The two upper incisor teeth on the left side were lodged in a depression observable there, and the canine tooth of the same side, forced out by the mass of the disease, had pierced the lip near its commissure. A fluid resembling mucus flowed from a narrow aperture at the lower part of the swelling. The tongue could not be seen, so much was it pushed backward, and for some time the patient had only subsisted on liquid food, which he was first obliged to convey to the back of his mouth by some mechanical contrivance. The four incisor teeth, two canine, and first grinders of the lower jaw, had been pushed out of their sockets by the pressure of the swelling. The patient's aspect was alarming, and he was threatened with suffocation. Extirpation was deemed necessary, and was performed with caution. The large cavity thus occasioned was filled with lint. The lower jaw being diseased, Boind scraped some of its surface off, and covered the place with lint, either dry or dipped in spirits of wine. Some exfoliations followed, and the fungous granulations that grew were repressed by proper applications. In three months the parts were healed in so regular a manner, that the motions of the tongue were not in the least obstructed, and no defect continued, except the alteration of voice, occasioned by the loss of teeth."

RESOLUTION.—The termination of inflammation, without abscess, mortification, or ulceration. Also, the disappearance of tumours, &c.

RETINA, INFLAMMATION OF.—In some cases of ophthalmia, the retina is principally implicated. The patient affected with this disease complains of intense deeply-seated pain, accompanied with the erroneous perception of flashes of light, and the power of vision

is nearly or entirely suspended. The treatment consists in active depletion, &c.

RICKETS.—This word is derived from *ῥιζα*, the spine, because it was originally supposed to be dependent upon or to originate in the back-bone. It occurs in children, and consists of a preternatural softness of the bones. It rarely begins before the child commences walking, and it sometimes first attacks the spine almost past the age of childhood. Children affected with rickets are also usually scrofulous, and always in bad health. The bones in it are soft and flexible, and bend under the weight of the superincumbent parts of the body. Bones affected with rickets are sometimes so soft that they may be readily cut with a knife; their walls are thin, and their interior, instead of being filled with marrow, is occupied by a semifluid jelly-like substance of a reddish colour. The quantity of earthy matter that they contain is much less than normal, and their specific gravity is diminished. All the bones of the body may be thus affected, but only those that have to bear weight indicate it by bending. Arms, for instance, in rickety children never bend, although the legs become arched, the spine curved, the breast-bones prominent, and ribs flattened, while the pelvis becomes deformed and contracted.

Rickets is not a dangerous disease, and although deformity is produced, the softness of the bones is recovered from. But rickety children, perhaps because they are generally also scrofulous, are very liable to take mesenteric disease, phthisis, hydrocephalus, &c.

While rickets consists in a deficiency of saline matter in the bones, there is no doubt but that it is a constitutional disease, and one essentially of debility. Accordingly, a nutritious diet, pure air, change of scene, bathing, and active exercise, are very useful in the rachitic diathesis. When the bones are in a yielding state, the erect posture must be forbidden, as that would cause curvature and distortion, particularly in the back-bone and in the bones of the lower extremities. Should the limbs have become distorted, they may, if the distortion be noticed in time, be amended by the application of splints, &c.

Although quite contrary to what would have been expected, bones affected by rickets are very easily broken by slight acts of violence, and when such an occurrence takes place, the reparation is effected by means of cartilage instead of bone, and the limb is moveable at the fractured part.

RUPTURE.—See 'Hernia.'

SANIES.—The thin serous matter, often tinged with blood, that comes from unhealthy sores, is so named.

SARCOMA.—Sometimes, in almost every part of the body, instances of diseased nutrition occur. The nutrient vessels, in such cases, instead of secreting the proper tissue peculiar to the part, alter its

texture, or, as occasionally happens, they only augment its size. These results of morbid nutrition are termed tumours, and these tumours are arranged into two divisions, those found in one of such being characterized by being solid. Any of these is termed a sarcoma. Of the sarcomatous tumours several kinds exist: among these we may include—

1. *The Vascular Sarcoma.*—This possesses a firm solid consistence. It is very freely supplied with blood, and seems, indeed, to be composed of blood-vessels and cellular tissue. It sometimes exists as an independent tumour, but commonly constitutes what is called simple enlargement of particular parts, as of glands, &c. The only inconvenience that it produces is owing to its size, which causes it to press upon other parts. Fortunately, it is very readily absorbed, and the application of a few leeches, followed by the internal and external employment of iodine, are generally sufficient to disperse the vascular sarcoma.

2. *The Fibrous Sarcoma.*—This is so named from its structure. It has a nodulated surface, and a compact consistence, which contains a number of yellowish cells. A variety of this tumour is softer, and is named by pathologists pancreatic, owing to its resemblance to the consistence of that gland. These fibrous tumours occur in the neck, arm-pit, and about the breast, and in this last situation sometimes so compress the mammary gland as to cause it to be nearly absorbed. Fibrous tumours never take on a malignant character, and only produce inconvenience from the pressure that they occasion upon other parts. Hence, in general, they are best let alone, particularly as, after they attain a certain size, they tend to remain stationary and to increase no more.

3. *The Adipose or Fatty Sarcoma.*—This is an abnormal deposition of fat, which is surrounded by a thin capsule. It occurs most frequently in young females, and in middle-aged people of both sexes. Occasionally, it grows to an enormous size. Sir Astley Cooper, for instance, cut out one that weighed twenty-seven pounds. The greatest inconvenience of this tumour is owing to the pressure which it exercises upon adjoining parts, but it does sometimes assume a morbid action. Adipose tumours neither spontaneously recover nor yield to treatment, and, consequently, for their removal excision is necessary.

4. *Cystic Sarcoma.*—This is characterized by having a number of compartments in it. These are filled with a substance more or less of a fluid nature, and usually of a yellow or purple colour. The cystic sarcoma is most common in glandular parts, but is also developed under the integuments of the trunk. It is not prone to take on any morbid action, but there appears no limit to the size which it may attain to, and it may produce great uneasiness and deformity. The only remedy for it is excision.

SCALPEL.—Properly speaking, this is an instrument for scraping a bone, but it is now applied to any small surgical knife.

SCARIFICATION.—This expression signifies the operation of making little cuts or punctures to let out fluid or blood.

SCIRRHUS.—The state of a cancer before it ulcerates.

SCROFULA.—The most frequent of the surgical diseases that are connected with the scrofulous diathesis, are lumbar abscess, many affections of the joints, and spina bifida,—all of which see.

SEQUESTRUM.—An exfoliation from the internal surface of a bone affected with necrosis, is so named.

SETON.—This is a modified kind of issue. It is made by means of a flat needle, from half an inch to an inch broad. This needle is double-edged, and has an eye that can contain a skein of silk. A fold of skin is then pinched up, and the needle pushed through it, together with the skein of silk, which has previously been dipped in oil. The silk is allowed to remain untouched until suppuration come on. Afterwards, the part of the thread nearest the wound is to be rubbed with cerate, and then drawn gently backwards and forwards. This process must be repeated once or twice in the day, and in this manner a discharge is constantly kept up.

SIGHT, DEFECTS OF.—Besides the morbid states of the eye produced by amaurosis, cataract, and the various inflammations, there are various other defects of vision. Some people are incapable of discovering one colour from another, and many, perhaps very many, cannot distinguish particular colours. Dr. Nicholl has recorded a curious case of this kind that he met with in a boy eleven years of age. This youth never called anything green, and a dark hue of this colour appeared to him brown. He could distinguish a light yellow, but a dark yellow he took to be a red. He mistook dark brown for black, and pale green for red; pink he called blue, but red and blue he always perceived rightly enough.

There are various morbid states, too, in which incorrect notions are formed of size. Thus there is a case recorded of a man to whom everything seemed just half the size that it ought to have done. It also appeared twice too near. An emetic and some other medicines were given to him, and he recovered. Some individuals, too, perceive the outlines of objects amiss. The son of an artist, for instance, was taught to draw by his father, and, greatly to his father's surprise, drew everything upside down, and declared that to him they appeared so. At the end of a year this morbid vision disappeared.

SINUSES.—Sometimes the cavity that remains as a consequence of an abscess does not fill up, but continues to secrete (usually a watery) pus. The treatment consists in stimulating applications, and, these failing, laying them open with a knife.

SPHACELUS.—The last stage of mortification.

SPINA BIFIDA.—This means literally the cloven spine, and is attended with an incomplete state of some of the vertebrae, and a consequent fluid swelling. It is most common in the lumbar vertebrae. The swelling is soft, and diminishes on pressure, the tumour, however, returning the moment the pressure is withdrawn. Fluctuation may be distinctly felt in it. There is no discoloration of the skin. The size of the tumour varies, but is not often bigger than an orange, and is seldom attended by pain.

This tumour consists of a sac filled with watery matter, and is composed of the membranous sheath that lines the spinal canal; it projects because the spinous processes of the vertebrae are congenitally deficient.

Spina bifida is usually associated with other affections, and children suffering from it rarely outlive a year. It usually goes on enlarging, and sometimes bursts and ulcerates, in which case, death very soon comes on. Occasionally, those born with spina bifida have lived to adult age, in which case the lower extremities are generally paralytic.

Opening the tumour only hastens the fatal termination of the disease; it never gets well of itself, or under the influence of treatment, so that, in general, the disease is best not meddled with. One or two cases, however, appear to have recovered, in which the fluid was allowed to escape through a puncture made by a needle, and then pressure applied.

SPINA VENTOSA.—Sometimes suppuration occurs in the spongy texture of bones. When the matter is collected in the interior of such a bone, there is an enlargement of the outer shell of it; this is called a spina ventosa.

SPINAL MARROW, CONCUSSION OF.—The spinal marrow, like the brain, is liable to suffer from concussion after an injury. In such cases the patient loses sensation and motion in those parts of the body supplied below where the concussion is. Unlike concussion of the brain, concussion of the spine is not recovered from in a few minutes, but the spine usually remains in a state of inaction for a day or two.

The treatment is rest, and carefully watching for the appearance of inflammation. If this come on, the patient must be well bled, and take purgatives, and, if the disease get into a chronic state, counter-irritation must be assiduously employed.

SPINE, CURVATURE OF.—See 'Vertebrae, Diseases of.'

SPINE, INFLAMMATION OF.—See 'Vertebrae, Diseases of.'

SPLINTS.—This is a piece of wood, or some other hard substance, used by the surgeon to keep some part of the body in a fixed position, and particularly for keeping the broken ends of fractured bones in constant approximation to one another. The form and size of splints will, of course, vary in different

cases. They are usually made of light wood, and generally several small pieces of it are pasted together on a strap of linen, in such a way that they are flexible in one direction. Sometimes, too, splints are made of tin, of pasteboard, and of strong leather. Another plan, now a good deal followed, is to form a splint of stiffened linen, the stiffening being effected by means of gum and water, or white of egg and flour. These are applied wet, and when dry of course fit exactly to the leg, and, moreover, become very rigid and firm.

STAPHYLOMA.—This is derived from a Greek word that signifies *a grape*, and is a disease of the eye, in which some part of the eyeball is protruded beyond its natural position. It signifies, says Cooper, "that disease of the eye in which the cornea loses its natural transparency, rises above its proper level, and even projects between the eyelids in the form of a whitish, pearl-coloured, or bluish tumour, attended, when the whole cornea is affected, with loss of sight. To this grievance are added, in bad cases, all the evils which necessarily result from the protuberance of the cornea. The inability of closing the eyelids, the exposure of the eyeball to the air, and extraneous matter suspended in it, and the friction of the eyelashes against the tumour, render the eye painful and inflamed, while the constant dribbling of tears is apt to make the cheek and lower eyelid inflame and suppurate."

Staphyloma is the result of inflammation of the cornea, and almost always begins in childhood. If the irritation produced be very great, it is best to cut away the projection.

STEATOMA.—This is an adipose sarcoma.

STRAINS.—Overstretching of a ligament. See 'Joints.'

STUMPS.—Stumps are liable to corns from pressure. The treatment of such in no degree differs from that of ordinary corns. Sometimes stumps are affected with neuralgia so severe as to require a second amputation.

STYE.—A little inflammatory tumour on the eyelid.

STYPTICS.—Surgeons now trust very little to these remedies for arresting hemorrhage. In the case of an external hemorrhage, the surgeon now at once ties the vessels; and if they are so situated that he cannot get at them, the only, or almost the only, styptic that he tries, is the application of the actual cautery.

SUPPURATION.—This is that particular stage of inflammation in which pus is secreted. Formerly, this pus was regarded as derived from the putrefaction of the parts affected, or of the blood circulating through them, but is now known to be the excretion of the capillaries of the inflamed part. When it begins to be so secreted from an outside sore, the treatment consists in at first reducing the violence of the inflammation that generally accom-

panies it, by blood-letting, purgatives, warm fomentations, and the like, and afterwards by using stimulating and astringent applications, as sulphate of zinc lotion, &c.

When suppuration takes place within the texture of a body, an abscess, as it is called, is formed. The matter thus effused is generally confined within a cavity, of which the walls are the effused lymph. When suppuration takes place, the intense inflammatory pain subsides, and is succeeded by violent throbbing. And when it has gone on for a little time, the fluctuation of fluid may be distinctly felt. Usually, the pressure of the pus causes absorption of the adjoining parts, which goes on until the surface is reached, although it may be, and sometimes when existing in even very large quantities is, absorbed. When it reaches the surface, it is, of course, evacuated, and the sides of the cavity that contained it collapse, and by means of granulations become united together.

In almost every case of such abscess, a very considerable time would intervene between the secretion of the matter and its evacuation. Of course, all this is attended with very considerable pain and irritation. Hence, it is the usual practice to make, whenever the fluctuation can be distinctly felt, an artificial opening, to let out the matter. Indeed, the formation of matter itself is better expedited by means of poultices and other hot fomentations. The abscess is best opened by a knife; and after the matter has run out, a piece of oiled lint should be placed in the wound, and a poultice applied, and renewed from time to time for a few days, until matter ceases to flow, and the sides of the cavity have agglutinated together.

SURGERY, DEFINITION OF.—It is not very easy at the present time to define surgery. Perhaps the best account of it is, that it is the art, based upon a certain amount of medical science, that undertakes the treatment of diseases that are evident to the eye, and which does all the manipulation about a sick person that is not the business of the nurse. Until recent periods, the surgeon was a mere manipulator, who acted under the instruction of the physician; but for long he has been prescriber as well as operator; and, moreover, in that class of cases that falls under his province, he prescribes internal treatment, and such general rules to his patient as he thinks fit.

Although it is quite easy to define the distinction between physician and surgeon in the abstract, it is evident that there is a great breadth of common ground between them. As Mr. Laurence remarked, "Nature has connected the outside and inside so closely, that we can hardly say where one ends and the other begins. She has decreed that both shall obey the same pathological laws, and has subjected them to such powerful mutual influences, that we cannot stir a step in investigating the diseases of

either without reference to the other. How deep would the domain of surgery extend according to this view? Half an inch or an inch? The entrance of the various mucous membranes presents a series of puzzling cases, and the distribution of diseases in these situations, between the two branches of the profession, is quite capricious. How far is the surgeon to be trusted? He is allowed to take care of the mouth. Where is he to stop? At the entrance of the fauces, in the pharynx, or in the œsophagus? Inflammation and ulceration of the throat belong to the surgeon; catarrhal affections of the same membrane to the physician. Polypus and ulceration of the nasal membranes are surgical; coryza is medical. The affections of the bones and joints have been given to the surgeon, yet they can hardly be called external parts. In hernia and aneurism, there is external tumour; but it is produced by displacement, or disease of organs that are quite internal. When we look to the nature and causes of disease, the absurdity of the distinctions, now under consideration, is still more apparent, and the inseparable connection between the interior and exterior of our frames more obvious. Internal causes produce external disease, as we see in erysipelas, carbuncle, nettle rash, gout, and œdema, while external agencies affect inward parts, as in catarrhal rheumatic affections, and in various inflammations of the chest and abdomen."

Notwithstanding all this, all our public hospitals have a medical and a surgical division; and the clerk who takes in the patients has never any difficulty as to which division any patient that comes in shall be sent to.

In common language, the word surgeon is very generally applied to the general practitioner.

SURGERY, HISTORY OF.—Surgery was cultivated at an earlier date than medicine, accidents being, in a primitive state of society, more frequent than diseases. In Egypt, it probably attained a high pitch of perfection, perhaps equal to that which it now possesses. Upon the walls of the temple at Thebes, are representations of amputated legs and other parts of the body, and also of instruments that are very similar to those used at the present day. Egyptian civilization, however, had its time, and passed away; and we know that in early Greece surgery was at a very low ebb. It seems to have been practised by the priests, and to have consisted as much in charms and incantations as in more rational appliances. The practice of surgery, however, was not confined to the ecclesiastics, but was sometimes the province of the warrior, and held in much honour. Thus, when Machaon, who was one of the chiefs chosen to be concealed in the wooden horse at the siege of Troy, was wounded in the shoulder with a dart, Idomeneus cried, "O, Nestor, pride of Greece, mount, mount upon your chariot, and let Machaon mount with you; hasten

with him to our ships, for a warrior who knows as he does how to relieve pain, and to cure wounds, is himself worth a thousand other heroes."

Hippocrates practised surgery, but appears to have considered it inferior to medicine, and to this, and to the impossibility of performing human dissections, must be ascribed, probably, the fact that his surgery is far inferior to his medicine. It has never been decided as to whether Celsus was an actual practitioner, or a medical philosopher only; but with him surgery held a very prominent place. A surgeon, he says, should be young, or at any rate not very old; his hand should be firm and steady, and never shake; he should be able to use his left hand with as much dexterity as his right; his sight should be acute and clear, his mind intrepid and ignorant of pity; so that, when he is engaged in doing anything to a patient, he may not hurry, nor cut less than he ought to do, but finish the operation as if the cries of the patient made no impression upon him.

Galen appears to have cared little for surgery, and those who succeeded him added little to the art. Paulus Ægenita collected together the prevailing surgical practices and opinions, and soon after his day Roman surgery fell with the Roman empire.

The Arabians, however, became possessed of a great many of the Grecian manuscripts that lay in the ruins of the libraries, and translated and appropriated them. They added, however, nothing of importance to surgery, but drew up vast compilations, which began to serve as text-books to the inhabitants of mediæval Europe. Here medicine and surgery became fairly disunited. The practitioners of the former were mostly ecclesiastics, to whom the shedding of blood was prohibited; and it was probably about this period that the practice of surgery became a part of the province of the barber. For a long period the surgeon implicitly followed the rules laid down by the ancients and the Arabians.

The founder of modern surgery was Ambroise Paré, surgeon to Henry the Second, and to three succeeding kings of France: he practised his profession in various places, and attended the French army in the Italian campaigns, where his presence alone is said to have, upon one occasion, been sufficient to reanimate despairing troops. Having there extensive opportunity of studying disease, and being, by disposition, of an independent turn of mind, he published his writings, which his countrymen maintain are the foundation of surgery, as those of Hippocrates are of medicine.

In the succeeding century, the most celebrated surgeons were Wiseman in England, and Ruysch in Holland. In the last century appeared the great English surgical reformer Percival Potts. "His life," wrote Cooper, "formed an epoch in the his-

tory of the profession. Before his inculcations and example had produced a desirable change, the maxim of *dolor medicina doloris*, as we learn from Sir James Earle, remained unrefuted. The severe treatment of the old school in the operative part, and in the applications, continued in force. The first principles of surgery, the natural process and powers of healing, were either not understood or not attended to; painful and escharotic dressings were continually applied, and the actual cautery was in such frequent use, that, at the times when the surgeons visited the hospitals, it was regularly heated and prepared, as a part of the necessary apparatus."

The celebrity of John Hunter, as a physiologist, has thrown his claims as a surgeon into the shade. Yet even as an operator he was great. He removed a tumour from the side of the neck and head, as big as the head, so adroitly, that the wound healed by the first intention. He took out of the neck a tumour, which one of the best operators of the time had declared that none but a fool or a madman would meddle with, and the patient got quite well. But his greatest operative achievement was his new operation for aneurism.—See 'Aneurism.'

Since his time, surgery has been very zealously cultivated. It is almost invidious to mention names, but among the more distinguished surgeons may be enumerated Dutuyrein, Cooper, Hay, Abernethy, and Scarpa.

SUTURE.—This is a mode of uniting the edges of a wound, by keeping them in contact with stitches. Formerly, all wounds were thus secured, but now all wounds that can be kept in contact without them are so.—See 'Wounds.'

Several kinds of suture are used. These are denominated the interrupted, the uninterrupted, and the twisted. In the first, the edges of the wound are brought together by several single stitches, placed an inch or more apart. A threaded curved needle is passed through the skin from one side of the wound to the other, so as to take in about a third of an inch of healthy skin on each side. The needle is then cut off, and the two ends of the suture tied together in a double knot. As many threads are put in as the wound requires, and the edges between the sutures are kept together by means of sticking plaster.

The uninterrupted or glover's suture, as it is sometimes called, is thus made:—A single thread is carried alternately, from one side to the other, the whole length of the wound, the needle being, in each stitch, passed from the border of the wound towards the healthy skin. This form of suture is employed in wounds of the abdomen, in which it is indispensable that every part of the opening be thoroughly closed, in order to prevent any of its contents escaping.

The twisted suture is used in parts, as the lips,

where the skin is very loose. Instead of threads, one or more pins are passed across the wound, and through the adjacent skin, and the edges of the wound, being brought together, are kept so by twisting silk round the ends of the pins.

TAPPING.—This operation is for the removal of fluid from any serous cavity of the body in which it may have collected, so as to produce dangerous or unpleasant consequences. The instrument employed in it is called a trocar, and consists of a large and sharp needle, which fits into a tube. The whole is thrust into the cavity containing the fluid, and the needle is then withdrawn, the canula being retained, through the aperture of which the fluid flows.

The principal diseases in which tapping is occasionally necessary are, ascites, water in the chest, and, but rarely, chronic hydrocephalus.

TARANTISMUS.—This is the name given to a disease, or to a supposed disease, which has long been believed to be induced by the bite or sting of the tarantula spider. During the sixteenth century, it was very common in the kingdom of Naples; and a similar disease, although not in that instance attributed to an external injury, has occasionally prevailed in Scotland, where it is known by the name of the "leaping ague."

In the tarantismus, the person bitten by the spider fell into a profound stupor, and it was believed that nothing could rouse him from this state but music; upon hearing which, the bitten person became affected with an irresistible propensity to dance. As long as the music continued, provided it were sufficiently lively, the bitten individual danced until he or she fell exhausted, and, while dancing, frequently laughed, or shrieked, or wept. After a little rest, if the music were played, the dancing was resumed until a copious perspiration broke out, which seemed to cure the disease. The persons affected were usually women.

It is now known that the bite of the tarantula spider produces no such effects; and a portion of the cases were doubtless impositions, and the remainder nervous affections, of the nature of St. Vitus' dance.

TAXIS.—The operation of putting back a hernia with the hand.

TEETH.—The following observations regarding dentition, may be regarded as supplementary to the notices of the process in the substance of the work.

The teeth consist of two sets, of which one is destined to last for only a short part of life, and the other for the remainder of it. The first, or temporary teeth, are twenty in number, are much smaller than the after or permanent ones, and their texture is not nearly so hard. The permanent set are thirty-two in number, eight being arranged on each side of each jaw, those of one side corresponding

exactly with those placed on the other. There are four different kinds of them, differing in shape, and also in the uses for which they are destined; and each side of each jaw has two incisor or cutting teeth, one canine or tearing, and two bicuspid, and three molars, both of which latter are intended for crushing or grinding.

The child is born toothless, but the germs of all his first set of teeth are contained within his gums. These consist of a number of pulpy, gelatinous-looking little masses, each being enclosed in its own membrane or sac, and, which is curious enough, attached to them are the rudiments of what, years afterwards, are destined to be the permanent teeth. The first set, however, do not generally make their appearance out of the gums until the child has attained its fourteenth or sixteenth month, but some of them begin to break through much earlier, and the last ones may be much later. The following table, perhaps, gives the average in this respect:—

From five to eight months,...	The four central cutting teeth.
From seven to ten,.....	The two side cutting teeth.
From twelve to sixteen,.....	The foremost molars.
From fourteen to twenty,.....	The cuspids.
Last,.....	The behind molars.

At the age of from six to seven years, the first set become loose in their sockets, their roots are absorbed, and, if not extracted—an operation that requires very little force—they fall out. The change takes place in exactly the order in which they appeared, the central incisors falling out first, the lateral ones next, and, last of all, the hindmost molars. The following table may represent the average order in which they appear:—

Between six and seven years,....	The central incisors.
Usually about the same time,....	The anterior molars.
Between seven and eight,.....	The lateral incisors.
Between nine and ten,.....	The bicuspsids.
Between eleven and twelve,.....	The molars.
Between seventeen and a } varying period,..... }	{ The hind molars or wisdom teeth.

When the teeth—as they are very liable to do—become affected with caries to such an extent as to lay open a part of the internal cavity, toothache is very apt to come on, particularly after exposure to cold, or derangements of the digestive organs. The pain in toothache is not exactly constant, and varies very much in intensity in different attacks. The progress of the caries is attempted to be arrested by the dentist, who stuffs the hole with gold or silver foil, or various preparations. When the toothache fairly comes on, it is best treated by warmth, and the local application of opium; the best mode of applying this being by dipping cotton in laudanum, and stuffing the tooth with this from time to time. Essential oils, camphor, and other substances, are also frequently put into the hollow.

These appliances failing, the teeth or tooth is generally recommended to be extracted. This is done usually by the key, but by dentists by the forceps.

In many cases, however, the pain ceases, but the caries gradually goes on until the whole of the tooth, except the root, is absorbed. These stumps, as they are called, often give rise to very considerable irritation, as gumboils, suppuration of the cheek, which may open externally, ulcers in the nose, and general irritation. By means of an instrument called a punch, the dentists are able to force out the stumps—an operation that is sometimes necessary.

After a tooth has been extracted, there is sometimes troublesome hæmorrhage. This may generally be arrested by means of pressure, made with pledgets of lint steeped in some astringent fluid, as the tincture of myrrh. This failing, the actual cautery may be applied.

TENDONS, INFLAMMATION OF.—The tendons are easily, by inflammation, deprived of their vitality. This happens most frequently in the hand, constituting the disease called paronychia, or whitlow. The disease is a very intense inflammation, sometimes extending to many fingers, but usually confined to one, and often passing on into the palm of the hand. Sometimes, indeed, it originates in the palm. The swelling is, on both sides, but the inside is almost invariably most affected. The pain is very severe, and the swelling and injection considerable. A slight case ends in simple suppuration, the matter being poured out underneath the skin; but generally there is also sloughing of the tendons.

The cause of whitlow is some local irritation acting upon a previously deranged system. The best treatment consists in making, early in the disease, a free incision into the inflamed part. After this has been done, fomentations or poultices may be applied for a few days, and then stimulating lotions used.

It is improper to trust to poultices, as in such a case the matter is long in making its escape through the medium of ulceration, and the irritation being kept up, sloughing is the result. In some cases, the distal phalanx is deprived of its vitality.

TENDONS, RUPTURE OF.—Tendons may be torn either by external violence, or the excessive action of their own muscles. When the former is the case, the wound generally heals readily, but sometimes suppurates, and sinuses form which are long of getting closed up. Stimulating washes, bandaging, &c., are, in such cases, necessary.

The latter accident is, however, the more common, and the tendon most frequently ruptured by the inordinate action of its own muscles is the tendon Achilles at the heel. Generally, this tendon is ruptured in consequence of some violent exertion either to raise the body, or to prevent it from falling. A sensation is felt as if a blow had been received from some blunt weapon, and the power of extending the foot is nearly lost, so that the patient cannot walk.

The treatment consists in bending the knee, and

extending the foot as much as possible, so as to bring the ruptured parts in as close approximation as possible. The best apparatus for keeping the parts in such a position, is probably the slipper and calf-piece of Dr. Monro, to whom this accident happened.

TENDONS, WOUNDS OF.—Tendons, of course, are occasionally cut across in the case of wounds. The treatment consists in approximating the cut ends as nearly as possible. It is important to know, that even if these are not precisely in contact, they will be united together by means of a newly-formed substance. But if this be very long, the movement of the part will be effected, and it is always proper to try to make it as short as possible.

TENT.—This is the name of little rolls of lint, of a cylindrical or pyramidal form, once much employed in the treatment of wounds and ulcers, but now only used in those rare cases in which it is considered desirable to dilate a wound. Sometimes tents were made of gentian root.

TERACULUM.—A very sharp-pointed fine hook, with which to seize hold of and draw out wounded arteries, in order that they may be tied. There is also a teraculum forceps, kept shut with a spring, used for the same purpose.

TETANUS.—This is a violent and frequently repeated spasm of the voluntary muscles, produced by a punctured wound, in which probably a nerve has always been injured. Sometimes the muscles of the jaw or throat only are affected; in which case the disease is often called trismus, or locked-jaw. When the body is bent forward in it, it is called *emprostotonos*, and when, as is more usually the case, the muscles of the back are principally affected, and the body bent backwards, it is named *opisthotonos*.

Tetanus may come on in a very short time after the injury has been inflicted. The most extraordinary case of this kind took place in a man of colour, a servant to Professor Robison. This man hurt his thumb with a piece of broken china plate, and falling into convulsions, died in a quarter of an hour after the accident. Generally, however, the disease makes its advance gradually. At first there is a sensation of numbness and stiffness about the neck, with some difficulty of masticating and swallowing, and this latter is often particularly the case with regard to fluids. Frequently, to these succeed a pain under the sternum, and immediately afterwards the spasms of the neck and other parts of the body may begin. These spasms are sometimes so violent that the teeth are broken.

These spasmodic contractions of the muscles are attended with very excruciating pain. They never, or not often, entirely disappear, and are usually in a state of exacerbation every ten minutes or so; and these paroxysms are sometimes brought on by the most trifling causes, as the attempt to speak or

swallow, or to make the slightest change in the patient's posture.

There is not usually seen, towards the close of an attack, any delirium in tetanus, and often the appetite remains generally unaffected.

Tetanus was but too common in our army during the Peninsular campaign, and many hundreds of cases of it were carefully observed. The disease was noticed to come on at uncertain periods after the reception of the injury, and terminated on the second, third, fourth, even so late as the twentieth day, although it was rarely protracted beyond the eighth.

Tetanus is much more frequent in hot climates than in cold ones, and it seems to be more frequent in those who, having suffered injuries, are much exposed to moisture. Every class of individuals is exposed to its attacks, but it is more frequent in young children and middle-aged people than at other periods of life, and also occurs oftener in men than in females.

It has been observed, too, that tetanus comes on more frequently after wounds of the extremities, than from injuries of the body, head, or neck; and that it occurs most frequently of all after injuries of the toes and fingers. Sometimes it has made its appearance after extremely slight wounds. Thus, Dr. Reid knew of a case in which the disease followed the mere stroke of a whip lash; Andral saw it appear in consequence of putting in a seton; it has been known to be produced by the stroke of a cane, to succeed the extraction of a tooth, and Larry had one case that was caused by a fish-bone catching in the throat.

In the treatment of tetanus, the principal reliance is to be placed upon opium, and the quantity that the constitution, under such circumstances, can bear is very great. Instances are recorded, in which twenty grains of crude opium have been taken every two or three hours for many days without any narcotism being produced. It is always necessary, however, to begin with ordinary doses, such as forty drops of laudanum, and repeat and increase the dose according to the symptoms.

Ever since the days of Hippocrates, cases of tetanus have occasionally been treated with cold water. In the West Indies, where tetanus is common, the patient is plunged into a cold bath every three or four hours; but as opium is also administered, it is not easy to decide as to the real action of the water. One case mentioned by Sir James Macgregor, certainly seemed cured by the application of intense cold. In the march of the Guards through Galicia, one of them was attacked with tetanus, owing to a wound of the finger. The disease made its appearance in a wretched village, in which it was impossible to leave the man, who was therefore carried on a bullock cart in the rear of the battalion. During the first part of the day he was drenched with rain,

the thermometer standing at 52°. In this wet state they marched up a high mountain, where the thermometer indicated a heat of 30° only. To this the man was exposed from six in the morning to ten at night, when he was found nearly dead, indeed, with the cold, but quite cured of the tetanus.

THORAX, WOUNDS OF.—A mere outside wound of the chest, that does not penetrate its cavity, requires no special treatment. If, however, they do so penetrate, special and very careful treatment is required.

If air be admitted through the aperture, the lung contracts, the contraction being in proportion to the amount of air that is allowed to enter. If one lung be from this cause considerably contracted, great oppression is felt in the chest, the lips become livid, and there is danger of congestion and inflammation of the other lung coming on, in consequence of the additional work that it has to perform. In such an accident, the chest should be surrounded by a tight bandage, the strictest rest enjoined, blood abstracted from the arm, and antimonials administered.

If the wound, besides penetrating the parietes, has wounded the lung, the case is still more serious, as there is danger of suffocation. There is some discrepancy of opinion amongst surgeons as to the treatment of such a case. The following is Mr. Syme's :—"It appears to be the more prudent practice to afford free exit to the blood, by keeping the original wound open, or making a new one in a more convenient situation, while by bleeding from the arm, and the other means that promote the cessation of hæmorrhage, by inducing coagulation in the wounded vessels, the farther flow of blood from the lung is restrained."

THROAT, WOUNDS OF.—When suicide is attempted by cutting the throat, if one of the large vessels is cut there is instantaneous death. This, however, is very rarely the case, the strength of the slash being expended in cutting through the tough pharynx and air passages.

When the gash—as is commonly the case—is made above the entrance of the larynx, there is danger of the blood accumulating in the pharynx, and thus getting into the larynx, where it would produce suffocation, and also, during swallowing, the food is apt to escape out of the wound. To prevent the former of these happening, the cut edges must not be brought together until the bleeding has ceased; and for the latter, the food must be injected into the stomach through a catheter.

There is generally a good deal of medical treatment required. This consists in counter-irritation (if there is cerebral excitement), the application of cold, opium, and, perhaps, above all, kindness.

THROMBUS.—This means a clot of blood that sometimes appears under the skin of the arm in venesection. It arises from the opening in the vein

not exactly corresponding with that in the skin, and may be produced by the patient turning his arm while the blood is flowing. It usually is soon absorbed.

THYMUS GLAND.—This is the organ which, in the calf and lamb, constitutes the sweetbread of the butcher. It is situated between the sternum and the larger vessels arising from the heart. In a new-born child it is of considerable size, but gradually lessens, until, at last, it almost disappears.

The thymus gland is composed of a number of small lobules, held together by cellular tissue, and containing cavities or cells, filled with a milky fluid which closely resembles the fluid of the lymphatic glands of older animals. Of its functions, nothing is known with certainty, but it is supposed to have some connection with the nutritive functions. By the age of twelve or fifteen years, it is found to have almost entirely disappeared. It is rarely diseased; but sometimes, particularly in scrofulous subjects, remains too long. When this is the case, it has been supposed, but not, by any means, with certainty, to induce asthma.

THYROID GLAND.—This organ is situated in the middle and fore part of the neck, in front of the larynx. It is much larger in young children than in grown-up people. The substance is firm, fleshy, and very vascular, and its interior contains cells, which, in young people, are filled with a fluid substance. Of its use nothing is known, and it is chiefly remarkable for becoming occasionally very much enlarged, and then constituting the disease called bronchocele, or Derbyshire neck, noticed in its proper place.

TONGUE, CANCER OF.—This dreadful disease is, fortunately, not very common. It is more frequent in females than in males. It is characterized by hardness and pain, and the only remedy for it is extirpation of the affected part, and even that is seldom permanently effectual.

TONGUE, ULCERS OF.—The tongue is liable to become the seat of obstinate ulcers, which are either produced by a rough bit of tooth, or the result of general derangement of the digestive organs. In the former case, the rough surface of the tooth must be made smoother; in the latter, the stomach put right; and in both, the sore bit be touched with nitrate of silver.

TONSILS.—In consequence of inflammation, suppuration sometimes takes place in the tonsils. When this happens, the matter effused extends into all the surrounding cellular tissue, and thus produces a large swelling, which generally renders deglutition impossible, and occasionally interferes with the breathing. If left alone, this tends to point; but it is generally better to make an opening for it, as it might naturally burst during sleep, and the matter escape into the windpipe, &c. Care, however,

must be taken to avoid injuring the internal carotid; and, in order to prevent this, the lancet must be introduced a little nearer the mesial line than the wisdom tooth, and pushed directly backwards, and not at all outwards in the direction of the ear.

The tonsils are very liable also to become the seat of obstinate ulceration. By far the best treatment for this is touching the ulcers with a pencil of nitrate of silver.

The tonsils are likewise liable to enlargement from chronic inflammation. Besides the swelling, which is sufficiently apparent, there is pain in the throat, huskiness of the voice, respiration performed with the mouth open, and often more or less deafness from obstruction of the eustachian tubes. The caustic may be tried; but the best remedy is extirpation of the enlarged organ, or of a portion of it.

TOURNIQUET.—An instrument used for compressing the main artery of a limb, and thus arresting hæmorrhage.

TRANSFUSION.—This term is given to an operation, which consisted in transfusing the blood of one man into the circulation of another, as a therapeutical remedy. Although it has been tried from time to time, it is justly considered a dangerous and improper plan.

TREPAN.—A circular saw, by means of which the skull is perforated, or a circular portion of any bone sawed out.

TREPHINE.—A cylindrical saw, now commonly used for perforating the cranium.

TRICHLIASIS.—This is a morbid state, in which the eyelashes, instead of being in their proper position, and protecting the eyes, turn inwards upon them, and thereby induce constant irritation. The disease is best treated either by caustic, or by removing a portion of the integument of the eyelid, so as to tighten up its edge.

TRICHOSPERMUS, OR PUFF-BALL.—Several varieties of this fungus grow in our fields, all of which, when ripe and dry, contain a very fine powder. This powder was formerly much used by surgeons as a styptic. It is now, however, only used in domestic surgery, and is not more useful than lint or a piece of rag.

TUMOUR.—This literally means a swelling.—See 'Sarcoma.'

TYMPANUM, PERFORATION OF.—This operation is sometimes performed in cases of deafness that depend upon obstruction of the eustachian tube.

ULCERS.—An ulcer is a natural solution of continuity, produced by an excess of absorption over nutrition and secreting pus, and which is ultimately healed by means of granulation. See 'Granulations.' When this granulating process is going on in the right manner, an ulcer demands no treatment, except to be preserved from irritation from without. It should be kept very clean, and pro-

tected by a piece of lint smeared over on the side that touches the ointment with some simple ointment, or dipped in water, and kept in a moist state, by having a piece of oilskin or macintosh spread over. Generally, for the sake of cleanliness, this dressing should be renewed every day, or, if the discharge be small in amount, every second day. If the granulations look too exuberant, and as if they would produce deformity, they must be touched with caustic.

Ulcers, however, are not always so disposed to get well. One class of them are called by surgeons weak ulcers; and in such—which generally occur in feeble people—the surface is generally higher than the surrounding skin, and presenting large flabby granulations, often of a dark colour. The edge is smooth, the discharge thin and watery, and the pain little. These kinds of ulcers are particularly prone to be produced by burns. They are treated either by the stimulating ointments, or, as is now more commonly the case, by solutions, sulphates of zinc or copper, in the proportion of two or three grains to the ounce. Moderate pressure should always be employed, and the debility of the system, upon which the ulcer depends, removed by general treatment.

Another kind of troublesome ulcer is called the callous. These occur mainly in the legs of middle-aged and somewhat debilitated individuals, and are very troublesome, partly because they are difficult to heal, and partly because they are, when once healed, very apt to break out again. The surface of them is generally depressed, and no granulations are to be seen; the discharge is thick, and has a bad smell, and the edges are thick, white, and hard-looking. There is generally a good deal of swelling in the limb in which the ulcer occurs.

The treatment of the callous ulcer consists in making the patient rest the limb in a horizontal position, and in bandaging it from the toe upwards. A blister also may be applied upon the ulcer.

Surgeons also describe an irritable ulcer. These are generally deep, irregular in shape, with jagged edges, and have a thin bloody discharge; and they are almost always very painful. They occur in weak irritable individuals, and also in those who live too luxuriantly. The treatment of them consists in removing all sources of irritation, local or general. Fomentations and poultices, containing opium and acetate of lead, are very proper applications, and the general irritability should be combated by purgatives, &c.

Some ulcers are very prone to slough, (see 'Mortification,') and others again are specific, of which the most incurable is cancer—which see.

UNION BY THE FIRST INTENTION.—When the edges of a wound are at once united by means of effused lymph, without granulations, it is said to be united by the first intention.

UVULA.—This little organ sometimes enlarges, and irritates the throat. It is best, in such cases, to cut off a portion of the end of it.

That, also, which is commonly called a relaxed sore throat, is an enlargement, attended with dropsy, of this organ. It is best treated by astringent and stimulating gargles, and, these not proving efficacious, by excision.

It has been proposed, in cases of stammering, to excise the uvula, and an improvement in speaking has followed the operation; but, unfortunately, it is only of a temporary nature.

VACCINATION.—The best manner of performing this little operation is as follows:—A drop of water is put upon the glass on which is the vaccine matter, and, by stirring with the lancet, a little paste is made. This should be spread upon a bit of the skin of the arm, and then a number of slight scratches made with the point of the lancet, just sufficient to draw blood. Care must be taken that the place be not accidentally wiped.

VALGUS.—See 'Varus.'

VARICOSE VEINS.—See 'Veins, Diseases of.'

VARUS.—Children are occasionally born with the bones of their feet dislocated. If the toes are turned in, as is usually the case, the distortion is termed varus; if the toes are turned out, valgus; and both are popularly known as club feet. In some cases only one foot is affected, but generally both are alike implicated. At the time of birth, the bones of the foot are quite normal, and it is the ligatures and muscles that are in fault, the former being preternaturally lax, and the latter preternaturally tense. But as the affected individual grows up, the bones become changed in shape, the ligaments firm, and a large bursa mucosa forms in that part of the cellular tissue upon which the weight of the body presses.

The treatment consists in mechanical contrivances, applied early, before the distortion of the bones takes place.

VEINS, DISEASES OF.—Veins are liable to—

1. *Inflammation.*—Inflammation of the veins, or phlebitis, is a very severe disease, and one that, once excited in a vein, is very apt to spread to other ones. An inflamed vein is hard and painful, and the integument covering it generally red. There is an accompanying fever, always having a strong tendency to be of a typhoid nature, and the pulse is quick and small, the countenance anxious and depressed, the lips covered with sordes, and frequently a low muttering delirium.

If the inflammation be of any extent, and acute, it almost invariably proves fatal. After death, pus is found in the veins, and also quantities of it effused into joints, cellular tissue, &c.

The causes of acute inflammation of veins are mainly either tying a ligature around them, or long continued distention. The treatment consists in

attempting to keep up the strength by means of stimulants.

2. *Varix.*—Some of the veins are liable to become varicose—that is, dilated and tortuous. The veins usually affected in this manner, are the subcutaneous veins of the leg. It is the result of the veins affected having lost their natural elasticity, and, consequently, the power of resisting the pressure of the blood above them. But nothing is known as to the cause of this loss of elasticity, save that it more frequently comes on in tall people than in short ones. The distended veins appear like dark-blue canals, with tumours or knobs upon them. They are inconvenient not only from the pain that they occasion, but also from their occasionally bursting, and from ulcers forming in the skin near them that are most difficult to heal.

Formerly, it was the custom to apply a ligature around a varicose vein; a most dangerous proceeding, and very likely to induce fatal inflammation. The treatment should only be palliative, and consist of pressure applied either by a bandage or a laced stocking.

Sometimes, in varicose veins, the blood stagnates so much that some of its colouring matter is deposited, and forms vein stones, as they are called. These measure from one to four lines in diameter, but cause no inconvenience, and require no treatment.

VENESECTION, OR PHLEBOTOMY.—The most common mode of abstracting blood is by opening a vein, and the vein that is almost always selected for the purpose is the one at the bend of the arm. A bandage is put round the arm above the elbow, and tied with sufficient tightness to prevent the flow of the blood through the veins to the heart, while it does not obstruct the flow in the artery from the heart. The operator then steadies the largest vein with the thumb of one hand, and with the other pushes the lancet through the skin into the vein. As much blood as is ordered is now allowed to flow, and the bandage is then removed, a little folded lint put on the wound, and then secured with two turns of a binder.

Sometimes the external jugular is opened, and sometimes the veins of the foot, but neither with any frequency at the present day.

VERTEBRÆ, DISEASES OF.—The spiral column is liable to two very important diseases, inflammation and its consequences, and curvature without inflammation.

1. *Inflammation and its consequences.*—This occurs most frequently in children, and generally in children of a delicate and scrofulous constitution; but it may come on at any period of life. The symptoms of it are a dull, growing pain, increased by pressure and motion, followed by a swelling that makes the spinous processes of the inflamed vertebræ feel to project more than natural. Subse-

quently, there is numbness of the lower extremities, and difficulty of regulating the movements of them, which may end in complete paralysis. The general system, too, suffers, and the appetite and strength fail.

Generally, suppuration is induced, and the matter points at various parts of the body. When this is the case, the symptoms are much relieved; but there has usually been so much destruction of bone and cartilage, that the spinal column bends forward, and the spinous processes of the part where the bend takes place may be felt to form a projection behind. The disease is usually incurable, and the patient's strength is at last worn out. The treatment consists in determined counter-irritation, and a tonic regimen. All mechanical appliances are very improper.

2. Curvature of the Spine, or Lateral Curvature.—This disease is almost entirely confined to young females. The part affected is generally the dorsal part of the spine, which very gradually bends to one side, almost always the right. The consequence is, that the right shoulder appears larger and more prominent than the other, and the left hip likewise appears enlarged. The curve in the back may very easily be seen.

Constitutional weakness appears to predispose to it, but it is commonly induced by nearly paralyzing the muscles of the back with tight stays.

The treatment consists in abolishing the cause, strengthening the system by cold bathing and other tonic means, applying stimulating liniment to the spine, and a good deal of rest in the recumbent posture.

VISION, DEFECTIVE.—**1. Short-Sight.**—This, or Myopia, depends upon the images of surrounding objects being brought into a focus before they reach the retina. The consequence of this is, that all objects viewed at the ordinary distance of good vision are imperfectly seen, and, to obviate this inconvenience, the short-sighted person brings them to a nearer distance. A person having a perfect eye sees objects most distinctly when they are about fifteen inches from the organ of vision. When they require to be brought within ten inches' distance, the individual may be pronounced decidedly short-sighted; and, in some instances, the infirmity is so great that nothing is seen distinctly that is more than one inch from the eye.

The cause of myopia is some over-refractive condition of the eye, either the cornea or the lens being too convex, the humours being excessive or too dense. It is much more common in the higher and middle classes than in the lower, and occurs much more frequently among those who spend considerable time looking at minute objects.

In order to remedy the inconvenience produced by short-sightedness, spectacles, the glasses of which are concave on both sides, are worn. These

cause the rays of light to diverge before they enter the eye, and thus counteract the over-refractive power of that organ. The concave glasses are kept in the shops, of varying degrees of concavity, those of the shallowest form being called No. 1, and generally eleven more of increasing concavity are in stock, No. 12 being the highest. This rule, however, is not uniform.

2. Long-Sight.—This, or Presbyopia, is the very opposite condition to the one just described. The refractive powers of the eye may, from various causes, become too feeble; and the consequence of this is, that the images of external objects are not brought into a focus until they have passed the retina. Hence, a long-seeing person cannot distinctly perceive an object, unless it is more than fifteen inches distant from his eye. This affection is usually met with in people past middle age, owing to the cornea and lens becoming somewhat absorbed, and it is treated by wearing convex glasses.

WARTS.—A wart is an excrescence upon the cutis. They are not organized bodies, and do no harm. They are, however, a deformity, and may be generally cured by rubbing with caustic, or some other stimulating substance.

WASP, STING OF.—The best application for this is a little solution of ammonia or hartshorn.

WATER POULTICE OR DRESSING.—This consists of some folds of lint dipped in water, and covered with a piece of oilskin, in order to prevent evaporation. It is now very extensively employed as an application to ulcers.

WEN.—A common name for a tumour that has the form of a bag.

WHITE SWELLING.—See 'Joints, Diseases of.'

WHITLOW.—See 'Paronychia.'

WOUNDS.—A wound is a solution of continuity, the effect of external violence. When produced by a cutting instrument, and free from laceration and contusion, it is called an incised wound; when by hard blunt bodies, a lacerated wound; and when, besides the solution of continuity, a poison is introduced, we have a poisoned wound. Moreover, when the wound, of any of these kinds, is of considerable extent, there is sympathetic fever.

Wounds are almost always attended by bleeding and pain respectively, owing to vessels and nerves being cut.

The first thing to do in the treatment of a wound is to stop the bleeding. When the injury is not great, this may be done by promoting coagulation at the bleeding orifice by means of compresses and bandages. When, however, a vessel of such a size has been wounded as to wash away the coagulation as fast as it is formed, either the tourniquet or the ligature must be applied. Occasionally, as in bleeding after a tooth has been extracted, it is not possible to use either of these, in which case the actual cautery must be employed.

After having stopped the bleeding, the wound must be searched, to see if it have any extraneous matter in it, as bits of glass, dirt, &c.; as such, if left in, are sure to excite suppuration, and perhaps sloughing.

When this is done, the edges of the wound must be brought together in such a manner as will promote their union by the first intention. This is now usually done by means of straps of adhesive plaster, although sutures (see 'Sutures') are still sometimes considered necessary. If it is clear that union by the first intention will not take place, wounds must be treated as ulcers, (see 'Ulcers,') which in fact they are.

WRY NECK.—This is owing to a preternatural contraction of the muscles (and particularly of sterno-mastoid) of one side of the neck, by means of which the head is turned to one side. It sometimes comes on from exposure to a draught, but occasionally without any appreciable reason, although some general or local irritation may generally be detected. This is to be combated by means of antacids and alteratives administered internally, and by fomentations and counter-irritants applied over the contracted muscle or muscles. These failing, the tendon of the muscle must be divided.

YEAST.—This substance is sometimes employed as a poultice in cases of sloughing sores.

Good
208 Slats

211

