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THE

PRACTICE OF MEDICINE

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BY

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SIXTH EDITION



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PREFACE TO SIXTH EDITION

In this edition it has been found necessary to make changes in the work as a whole, and the sections on electricity and diseases of the liver, kidneys, and skin have been in great part re-written. The position of bacteriology has in due limits been generally stated, the micro-organisms under special affections described, and their relation to treatment mentioned. New wood-cuts have been inserted, and to the mode of writing prescriptions prominence has been given.

My thanks are due to Dr. MacLennan, Dr. Carslaw, and Dr. Macintyre for various suggestions on special subjects, and for assistance in seeing the work through the press.

Glasgow, *October* 1891.

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GENERAL CONSIDERATION OF DISEASE

WITH

BEDSIDE HINTS

WHAT is health? The answer to this inquiry can scarcely be given in the form of a definition, yet it requires no medical education to suggest a picture of what health is at the typical eras of human existence, when all the various functions of the human body are performed easily, naturally, and well. The healthy individual breathes without difficulty, the food taken is relished and properly assimilated, the blood is forced from its centre—the heart—onwards through the body, without valvular flaw or subsequent hindrance, and the brain, with its nervous expansion undisturbed by morbid fancies, controls the movements and the thoughts of the living organism. Disease is a deviation, to a greater or less extent, from what we thus realise, though we cannot define, as the standard of health. It may invade one or more of the systems we have alluded to, and it is the duty of the physician to find out, by the varied appliances of his art, what and where the disease is. Thus the student will perceive, what practical bedside experience teaches, that diseases are to be referred in many cases to certain systems—viz. respiratory, circulatory, digestive, integumentary, genito-urinary, and nervous. Each of these systems being liable to various diseases, and the allocation to one of these systems having been made, it is the

further province of the physician to ascertain, by a careful examination of the phenomena presented to him, what the particular disease which he is investigating may be. A little reflection or experience will, however, convince the student that all diseases cannot be brought under such a simple classification. There are certain diseases, by no means the least important, which, though presenting well-marked features during life, are found, by examination after death, not to have involved any one particular system. These must be called, for the want of a better term, General Diseases. The exact idea expressed by this will be better understood when these diseases are individually considered.

When we are called to investigate real or imaginary disease, the question presents itself to us, How is the nature of the disease to be determined? How is the inquiry to be prosecuted?

Pain is a prominent feature in disease, and important information may be obtained by asking—

"Where do you feel pain?" Follow this up by further inquiring—

"How long have you been ill?"

The patient in this way refers his pain to some particular part or parts, and tells the story of his illness in his own words, without any promptings on your side, which may be misleading. Now, with certain data to go upon, and with no preconceived, and therefore probably erroneous, ideas directing you, the systematic investigation can be justly commenced. If attention is directed to the chest, that region must be carefully examined by Auscultation, Percussion, Mensuration, Inspection, and Palpation. In order to facilitate inquiry, and to localise its evidences, the chest has been divided into certain regions, as the accompanying diagram will at once show; a fact which beginners should realise, not merely by looking at it, but by drawing the corresponding lines in ink on a friend's or fellow-student's chest.

In Percussion the Pleximeter and Hammer may be used, or, in lieu of them, the first two fingers of the left

hand may be applied flatly to the chest, and struck with the tips of the corresponding ones of the right. Being already familiar with the sounds in health, you compare one region with the corresponding region on the opposite

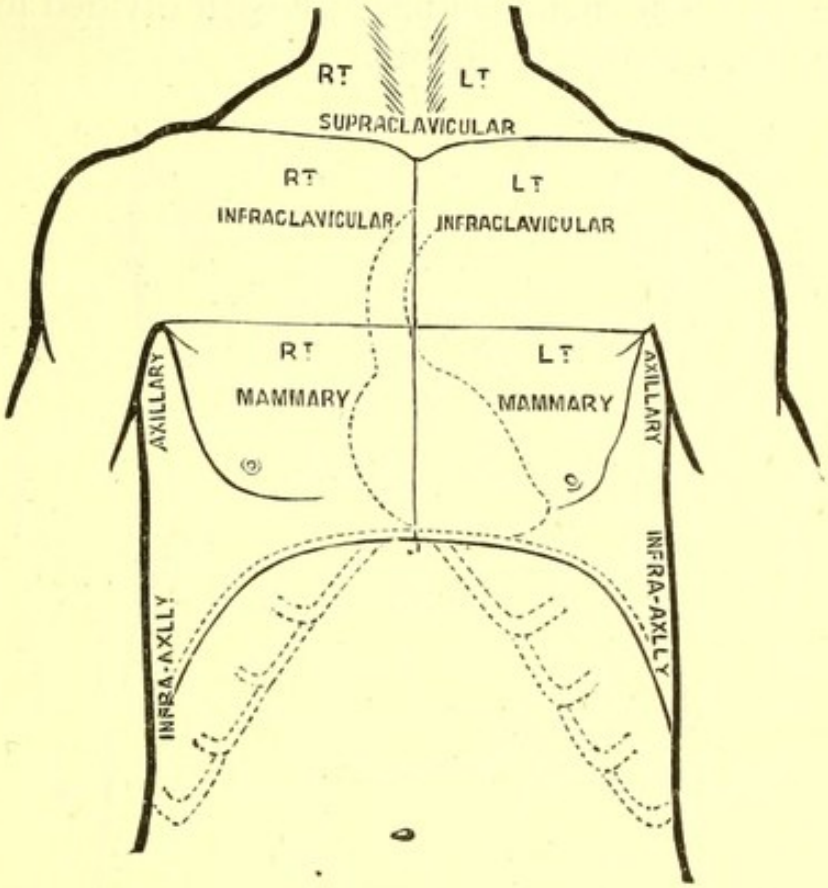


Fig. 1.

side, and note whether the sounds produced by percussion are healthy or the reverse, abnormally dull or abnormally clear.

Proceed in a similar way with Auscultation, by means of the Stethoscope, after carefully reading the chapter on Respiratory Sounds in Health.

Palpation, *i.e.* the application of the hand, shows the comparative movements of the two sides of the chest. It indicates also the vibration communicated to the chest wall by the voice, or what is called "Vocal Fremitus." Mensuration, by means of a graduated tape, reveals also the comparative size of the two sides, and in some cases, by special instruments, tells the actual and comparative movements of the chest in respiration.

But supposing your patient does not refer his complaint

to the chest, but to the stomach, then your inquiry must be directed primarily to the digestive system. Examine the tongue, ask as to his appetite and the state of the bowels. Percussion and Mensuration are now of great importance. The abdomen has also been divided by lines, as in the accompanying diagram.

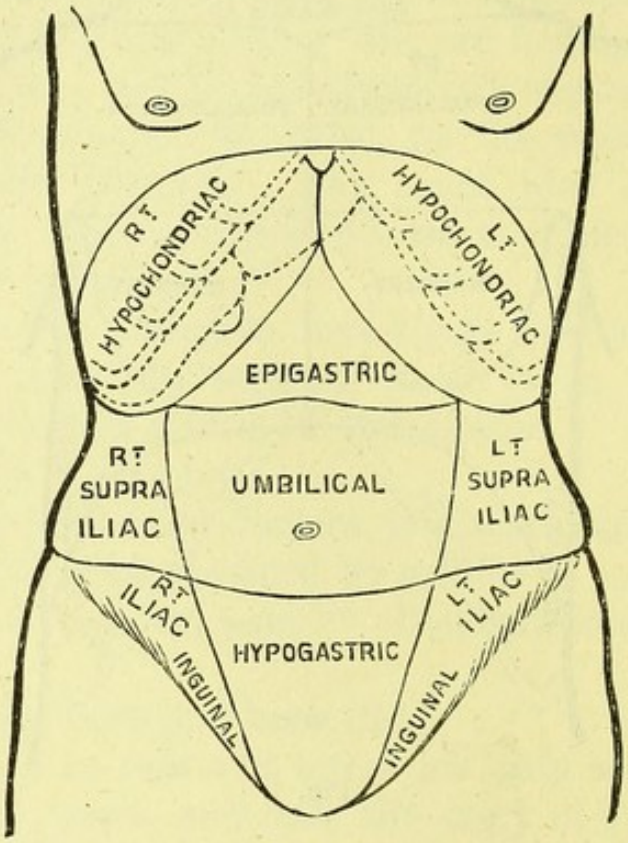


Fig. 2.

If the patient refers his ailment to the kidneys or the bladder, your inquiry must be particularly directed to the urine, for this is the keynote to diagnosis. Note its colour, take its specific gravity, etc. (See chapter on Urinary Diseases.)

If he refers his complaint to the nervous system, try to discover from the symptoms presented what disease it may be, remembering that the brain is complex in structure and function, and that the means which assisted you before are now of little avail,—"For the brain you can neither see, nor touch, nor handle." The subject is thus beset with greater difficulty than in the case of the other systems mentioned.

It is a matter of great importance, in the method of examination thus suggested, to remember that one system cannot be long involved without implicating, to a greater or less extent, some, if not all, of the others. While special attention is of course paid to the system

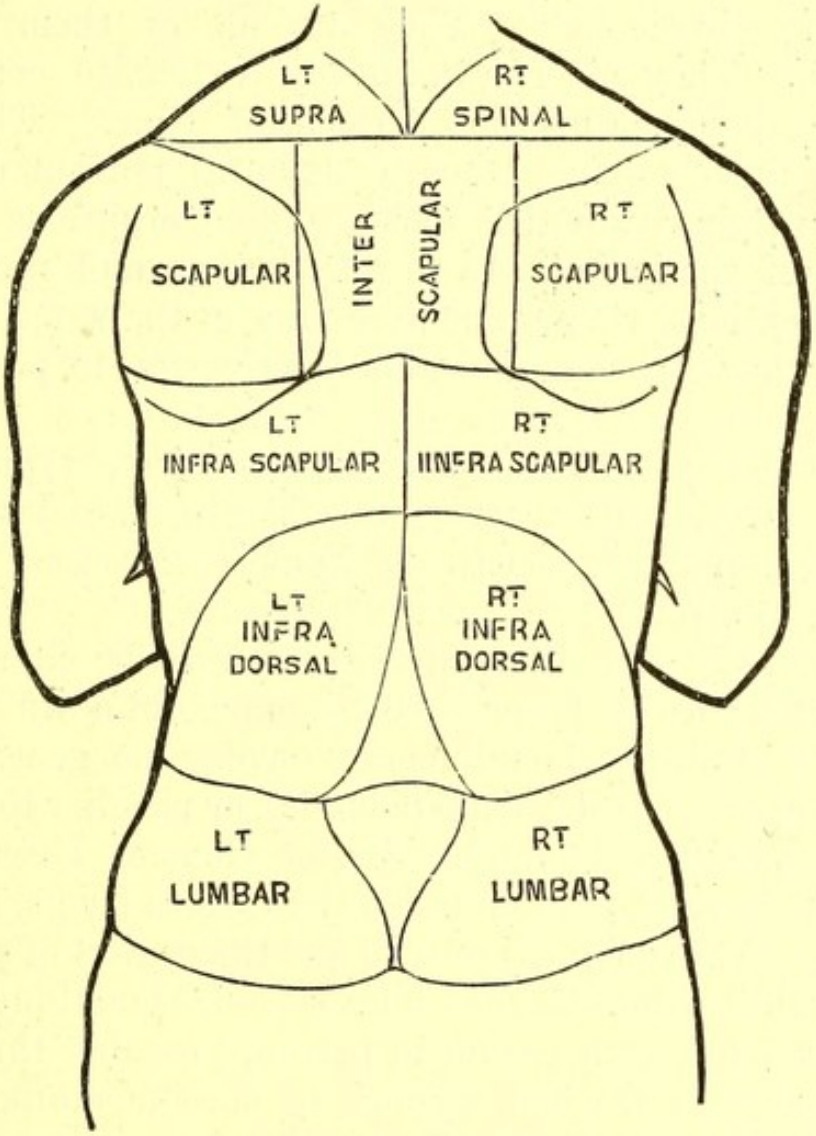


Fig. 3.

containing the organ primarily diseased, it is essential that the others should not be forgotten. It is immaterial in what order they are considered, but it is important that no one of them be neglected ; and it is astonishing how, after a little experience, the student quickly and instinctively goes over them all.

Negatively, "General Diseases" may be remembered as not being brought under the systems mentioned ;

ions. Zymotic diseases are distinguished by the lowing characters:—"They are all of them febrile seases. They all run naturally a definite course in finite though different periods of time. They all esent during some (usually definite) portion of that urse certain distinctive spots, making eruptions on e surface of the body. As a rule, broken and proved rare exceptions, they occur once only in the same rson. Lastly, they are communicable from person person by contagion, and arise in no other way.

"Small-pox, chicken-pox, typhus fever, typhoid or teric fever, scarlet fever, the plague, measles, hoop-g-cough, mumps, constitute Zymotic diseases." (Sir homas Watson.)

In investigating these diseases it will be found that ey appear to be propagated by some unknown though obably atmospheric influences, owning no general law, reading over a wide area (epidemic), or peculiar to certain ed localities (endemic). Under "General Diseases" it ll thus be seen are numbered the various fevers, some of hich seem the offspring of filth and the neglect of sanitary ws; while others depend on a specific something which transmitted from person to person, probably through a sease-germ, and which through its specific character can iginate only the disease from which it sprang.

Under "General Diseases" also are included various ates of the body, in which the blood seems chiefly plicated, and which reveal themselves by local and nstitutional and characteristic symptoms, as will be inted out when individually considered.

The student, therefore, in forming an opinion with gard to diseases connected with the various systems,

or with regard to general diseases, will see that an important element in this opinion or diagnosis must be the causation, the etiology, of the disease in question. Is it peculiar to one country or to many? Is it a disease of youth or age? Is it hereditary, or is it acquired? Is it dependent on known or unknown agencies? Is it characteristic of sex or occupation?

Having thought these things over, having gleaned what he can also from signs, symptoms, and history, his further duty is to form a prognosis, a forecast of the probable issue. Will it be fatal, or the reverse? What complications may arise, and how may these be averted? These and all previous considerations have one definite object in view, viz. Treatment, specially directed to the person who is ill, but also in certain cases prophylactic, *i.e.* guarding against the extension of the disease to others, if that be possible.

The nomenclature of diseases and classification adopted in the following pages will be generally based on the recently published recommendations of the Royal College of Physicians, London (2d edition). Adopting this classification, a few remarks will first be made on morbid states and processes, as such, irrespective of the part or parts affected.

HYPERTROPHY.

Hypertrophy, considered as a sign of disease, is used to designate excessive growth, and may be "GENERAL" or "PARTIAL."

General hypertrophy is seen in individuals of extraordinary size who are denominated "giants." These persons are generally of feeble constitutions and deficient in procreative power.

Partial hypertrophy may mean excessive increase of any part of the body during the period of natural growth; or increase after a part is distinctly formed. Hypertrophy may be thus congenital or acquired. The congenital form may be seen in one arm or leg of the same side.

causes, viz. increased work, pressure, inflammation, or physiological changes.

Hypertrophy, the result of increased work, is seen in the arm of the blacksmith, or the leg of the ballet dancer. The heart becomes hypertrophied when there is increased resistance to the flow of blood, either at the orifice of the organ or in the peripheral vessels.

Pressure moderate and intermittent of the hand leads to thickening of the epidermis, probably by an increase of the flow of blood. Inflammation when chronic tends to hypertrophy; thus the serous membranes, as the pleura, peritoneum, and dura mater, become thickened from chronic or repeated inflammation. The skin also in chronic eczema is thickened, and this condition may extend to the subcutaneous tissue.

Increased nourishment of a part combined with irritation or functional stimulus may originate hypertrophy, as in the cases of gastric and uterine derangements.

Physiological changes may cause hypertrophy of organs, as in the uterus by pregnancy, and the mammæ by suckling.

A question is asked in the process of hypertrophy, Does it depend on increase of the size of the minute elements of an organ, or only on increase of their number? In most cases the multiplication of the tissue elements is the cause of the hypertrophy, but increase of the minute elements also occurs, as in the pregnant uterus, and the development of one kidney when the other has been destroyed.

By "false" hypertrophy is meant a process by which an organ becomes outwardly increased in size, owing to the deposition within it of some foreign material, or to mere distension. Thus the liver may be subject to "false hypertrophy" by the deposition of fat; and emphysema of the lung increases the size of the organ, but at the expense of the true lung tissue, which is actually atrophied.

ATROPHY

Atrophy is a term confined, as a rule, to cases where there is a steady loss of bulk of a part, associated with impairment of health.

It is common at all periods of life. General atrophy is seen in infants under twelve months old, and is due then to unsuitable food, which causes vomiting, chronic diarrhœa, and wasting (marasmus). Tracing atrophy as years go on, we may say it is very often the result of INHERITED SYPHILIS. After twelve months and up to three years the child may be subject to RICKETS, and with this atrophy more or less marked is associated ; after three years the mesenteric glands are attacked by TUBERCULAR DEGENERATION, and atrophy ensues.

After the fifth or sixth year phthisis may set in, and wasting. Atrophy in the adult is rarely seen as a distinct disease, but it is associated with phthisis, cancer, and many organic diseases of KIDNEY, LIVER, HEART, and LUNGS.

Atrophy may be local, *i.e.* a part of the body does not grow like other parts, and the condition is sometimes congenital, and is evinced by arrested growth or congenital smallness. Sometimes there is a difference between the two sides of the body. Sometimes the arrest may show itself on one side only of the face. Sometimes, as in the cretin, the brain is stopped in growth.

Atrophy of parts may be seen at middle age as a physiological sign—the mammæ or testicles wasting.

By the term Acquired Atrophy is meant the condition associated with deficient blood supply to certain parts, as in the granular condition of liver and kidneys, through disease of the heart obstructing the circulation.

In two distinct diseases, both considered specially afterwards—progressive muscular atrophy and infantile paralysis,—loss of power in the muscles is associated with marked and rapid wasting.

Any interruption of the nervous channels, either above in the cerebrum or below in the nerve trunks, is followed

by degeneration ending in atrophy of the whole nervous tract leading from the cerebrum to the peripheral termination. This is the so-called SECONDARY DEGENERATION of the cord. In muscular tissue the wasting is almost as constant. Over-work from undue mental activity may produce degenerative diseases of the nerve centres, and excessive sexual indulgence may induce atrophy of testicles and ovaries.

HYPERÆMIA

This means an excess of blood, and may be either arterial or active hyperæmia, or venous or passive hyperæmia. Arterial hyperæmia is due to the relaxation of the walls of the arteries and consequent enlargement of the vessels, or it may depend on increased flow of blood through the ordinary channels being interrupted, and is then known as "Collateral Hyperæmia."

Examples of "Direct Arterial Hyperæmia" are seen in the result of a blow, or from heat, or the reaction from intense cold; or it may be indirect through the vaso-motor nerves being diseased and losing their contractile curb on the vessels.

Examples of "Collateral hyperæmia" are observed when an embolus blocks up an artery, or when disease obstructs the chief arterial sources of an organ and leads to peripheral channels becoming hyperæmic, as in cirrhosis of the liver, granular kidney, and sclerosis of the spinal cord.

The symptoms of acute hyperæmia are redness, increase of temperature at the part, with swelling through distension of the vessels, but not by exudation, which is characteristic of inflammation. There is also usually a sensation of heat in the part, or itching.

"Passive hyperæmia" may be due to feeble circulation or obstruction in the veins.

The action of the heart may be feeble—so feeble that there is not sufficient impetus to send the blood forward on its return current to the heart. In the erect posture

this will be seen in swelling and congestion of ankles and feet; or in the recumbent position in the nates, sacrum, and bases of the lungs (hypostatic hyperæmia). Cyanosis is the form of venous hyperæmia caused by imperfect formation of the heart, or as the result of certain diseased conditions of the lungs, as emphysema or chronic bronchitis.

Obstruction of veins may follow on a tumour, as in the swollen veins of the leg seen in pregnancy, or in the hæmorrhoids caused by pressure of hard fæces in the intestines. Venous obstruction due to disease of an organ may produce hyperæmia of the vessels supplying that part. Thus cirrhosis of the liver induces hyperæmia of the whole portal system. The symptoms of passive hyperæmia are evidenced in the veins being full of venous blood and producing a uniform purple colour. There is no throbbing and no unusual heat of the part.

Chronic hyperæmia leads, if continued, to transudation of serum and migration of red corpuscles through veins and capillaries. Internal organs are first enlarged, but owing to inadequate vascular supply and nourishment they become smaller and atrophy.

On external parts of the skin there is a tendency to ulceration, or liability to inflammation on slight causes. Thus eczema frequently arises.

HÆMORRHAGE

Definition.—The escape of blood from any part of the circulation.

With reference to the site of hæmorrhage certain terms are used. Thus *hæmaturia* implies bleeding from the urinary tract; *menorrhagia*, excessive bleeding from the uterus at the menstrual periods; *metrorrhagia*, bleeding (between these periods); *epistaxis*, bleeding from the nose; *otorrhagia*, bleeding from the ear. In medical practice the two chief forms of hæmorrhage are hæmoptysis (spitting of blood), and hæmatemesis (vomiting of blood),

and to the characters and causes of these a brief description will be given.

Hæmoptysis has its source in pulmonary or bronchial hæmorrhage, and when this is profuse the sputum consists almost entirely of bright red frothy blood, with hardly any trace of other matter. As the hæmorrhage diminishes in intensity the expectoration for several days exhibits a reddish or reddish-brown colour, and during this period leucocytes and epithelium are seen, the cells usually enclosing crystalline and amorphous forms of hæmatoidin. The formation of small cavities in the course of tubercle is the most common cause of pulmonary hæmorrhage; sometimes it is due to the rupture of an aneurysm developed from a branch of the pulmonary artery into the bronchi, and persistent hyperæmia of the lung may give rise to the condition. As a rule, in hæmatemesis the blood vomited proceeds from some serious lesion of the stomach, although it may at times occur independent of any such cause. When the hæmorrhage is considerable clots of blood are found which are not at all, or but slightly, changed; but more commonly the effused blood remains for a longer time in the stomach, and is thereby altered in such a way that the oxyhæmaglobin is converted into hæmatin. In consequence the vomit has the appearance of coffee-grounds. When examined under the microscope no blood corpuscles are to be seen in it, but in their place larger or smaller pigment masses. It is necessary to remember that the giving of preparations of iron will impart to the vomited matter somewhat the same appearance as that due to blood; so also will the taking of red wine, and that the presence of bile pigment may cause it to assume a brownish-black colour. Vomiting of blood is chiefly observed in ulcer or cancer of the stomach, and large quantities of blood pigment may be found in the vomit in cases of duodenal ulcer with hæmorrhage into the intestines. It may also appear as the result of partial congestion, as in cirrhosis of the liver; or it may be vicarious. Both forms of hæmorrhage are termed in

common parlance "vomiting of blood," but from what has been stated it is obvious that they depend on different conditions. It is significant that in hæmoptysis the blood is bright red in colour. It is frothy. It is attended with cough. It is partly mixed with other constituents of the sputum. It does not come up all at once, nor does it stop all at once, for the expectoration may reveal traces of blood for some days, and in the progress of the tubercular disease recurrences of hæmorrhage are not uncommon. The quantity brought up at a time varies from a tablespoonful or two to as much as two pints.

In hæmatemesis, giddiness and nausea are most likely to be felt, inasmuch as a considerable quantity of blood may escape into the stomach before vomiting occurs. The vomited blood is dark in colour. It may be mixed with food, and it is not preceded by a tickling cough. Further, as a rule, the quantity ejected is larger than in hæmoptysis, and the stools are "tarry" from part of the blood being carried into the intestine.

A peculiar condition of the body is known as the hæmorrhagic diathesis or hæmophilia, the subjects of which exhibit a remarkable tendency to profuse hæmorrhage even from trivial injuries (see p. 161).

DROPSY

Dropsy consists of the accumulation of a certain quantity of serous fluid in the subcutaneous cellular tissue or in a serous cavity.

It may in truth be said that Dropsy is rather a symptom of a disease than a disease itself, and that therefore the term Dropsy should be abandoned and only spoken of when the malady on which it depends is considered. This may be admitted to be a philosophical induction, but at the same time it is to be remembered that Dropsy sometimes during life cannot be traced home to its causation, nor in some cases can we after death ascribe it to any organic change. Besides, the term has

so crept into medical nomenclature that we cannot abandon it, and certain forms of Dropsy are familiarly known by the part where the effusion has taken place.

When confined to the subcutaneous cellular tissue it is termed œdema or anasarca; to the peritoneal cavity, ascites. Should the effusion be into the ventricles of the brain, or the subarachnoid space, the term hydrocephalus is applied; when in the pericardium, hydropericardium; when in the thorax, hydrothorax; hydrocele when in the tunica vaginalis.

Pathology.—In considering the pathology of Dropsy we must remember that continual exudation and continual absorption are going on in the tissues and serous cavities in health. Fluid exudes from the vessels and is absorbed partly by the veins and partly by the lymphatics. If obstruction occurs in a vein, œdema may follow at the lower part of the body, when the blood should return by the obstructed vein. Experimental evidence, however, shows that so long as the nervous supply to the region of the obstruction is intact, œdema may not be produced, for the lymphatics are able to return all the fluid which exudes from the capillaries. Thus if the sciatic nerve of a dog is divided, and a ligature is applied to the vena cava, the corresponding leg will become œdematous; but if the nerve is untouched no œdema will result. The cutting of the nerve occasions not simply paralysis of the limb, but paralysis of the vessels, with dilatation of the arteries. The result here is explained by the union of the sympathetic fibres of the vaso-motor nerves with the motor fibres of the sciatic in the sacral plexus.

Œdema is also observed in diseases associated with weakness and poverty of the blood. Thus in anæmia or purpura the composition of the blood is notably altered, and œdema is seen at the ankles, but without any obstruction of the veins. This is accounted for by the feeble action of the heart, which induces a slow circulation and a tardy return of the blood to the central organ. It is also due to the fluid exuded permeating more easily into the tissues.

So also the œdema of Scurvy may be explained.

There is little doubt that the œdema noticed in the later stage of phthisis would be apparent much sooner, were it not for the colliquative sweating so markedly associated with this disease. After these remarks we will now speak of the three leading forms of Dropsy, which may be referred to the heart (cardiac), to the kidney (renal), to the liver (hepatic).

Cardiac Dropsy.—In heart disease œdema always commences in the lower extremities; at first it is scarcely noticeable, then it is detected in the evening at the ankles and the dorsal aspect of the foot; but after a night's rest it is not seen in the morning. As the disease advances, the dropsy creeps upwards, first up the lower extremities, then into the scrotum and enlarging the penis; finally it comes to the superior parts, being observed in the hands, and in the very worst cases it appears even on the face.

The first internal cavity which suffers from transudation is the peritoneum, for local causes are here at work, in the affection of the region of the portal vein. Next to this come the pleural cavities, especially the left one, and with it generally the pericardium. Dropsy is not a mere symptom of cardiac disease, it is a link in the chain which literally clasps the patient suffering from this affection. The transuded fluid presses on the smaller vessels, creating new resistance to the circulation, and making fresh demands on the activity of the ventricles. The skin soaked with serum is disposed to inflammation, and when the œdema is very extensive blisters arise. These burst, and then follow erysipelatous, or deep-seated inflammation and tedious suppuration, which generally usher in the final stage.

Other causes than the impeded circulation operate, however, in producing cardiac dropsy. These are probably disturbances in the vascular innervation, which will lessen the propulsive force proceeding from the vessels. Another factor is the loss of albumen and solid components which the blood undergoes.

Renal Dropsy.—Old writers, as Hippocrates and Van Helmont, observed that the diminution of the urinary secretion was a cause of dropsy, yet the connection, as cause and effect, between kidney disease and dropsy was not understood until Bright published his observations. He showed that albuminuria was associated with kidney disease, and the loss of albumen rendered the blood watery; hence *hydræmia* was supposed by many to be the cause of renal dropsy. Yet further investigation proved that the hydræmic theory was in many cases untenable. Dropsy may ensue in a few days from the Acute Nephritis of Scarlet Fever, or Diphtheria, and these cases undoubtedly prove that the *non-removal* of the water from the system, while the *absorption* of water from the digestive tract is still going on as in health, can be the source of hydræmia and dropsy. Even in other cases of kidney disease the occurrence depends less upon the amount of albumen actually lost in the urine than upon the diminution of the water excreted by the kidneys.

We are therefore forced to look for another cause or causes producing dropsy in renal disease, and we may state broadly that dropsy in renal disease is due to the relative insufficiency of the kidneys to eliminate the urine from the system—an insufficiency which establishes a non-correspondence between the ingestion and the excretion of water.

Further, it is found that it is not the destruction of the Malpighian bodies, whose purpose it is specially to secrete the urinary water, which causes dropsy, but the obstacles which are opposed to the free discharge of the secretion through the renal tubules. The less the quantity of urine secreted, the more severe will be the dropsy, and the latter will fall directly when the water can again flow off by its natural channels. So the origin of dropsy in acute and sub-acute nephritis may be explained. But in chronic nephritis other additional causes often operate, for the paralysis of the hypertrophied left ventricle leads to disturbance of compensation, and results in the true

general dropsy of stasis, which is analogous to what has been depicted in uncompensated heart disease.

The aspect of the dropsical fluid in life varies. That obtained from the connective tissue is generally as transparent as water; that taken from any of the serous cavities of the body is pale yellow or light green in colour, with fine threadlike shreds or coagula floating in it.

The composition of the dropsical fluid in the dead body varies according to the site from which it comes. The fluid in the subcutaneous connective tissue is poorest in solid constituents and albumen; thus it may be 0·36 per cent, while the fluid contained in the pleura may be 2·85 per cent, and from the peritoneal cavity 1·13 per cent.

Renal dropsy begins first as general anasarca, and may exist thus for some time before it invades the great serous cavities of the body. The particular part of the body which first shows signs of becoming œdematous depends upon whether the patient lies in bed or moves about. If walking about, the first thing noticed is usually slight puffiness at the ankles when undressing at night; if lying in bed, there is observed swelling in the eyelids when he gets up in the morning.

Peculiar also to renal dropsy is the fact that the swellings change their sites. Thus the eyelids which were swollen in the morning may in the evening be free from any œdema; while the feet are found to be swelled, or if lying in bed on one side, that side of the face on which the patient lay will be found considerably swollen, while the other will be unaffected.

The influence of gravitation doubtless explains partly these appearances, yet we are unable to understand why sometimes in renal disease the dropsy is circumscribed, or presents itself in unwonted situations, and remains there occasionally with strange persistence.

The swelling of the whole body in renal disease may sometimes be very extreme, and as such it may last for a long time. The graver forms of renal dropsy are usually sooner or later complicated by effusions into the serous

cavities, or by œdema of the lungs, or of the mucous membrane of the stomach and intestines.

Hepatic Dropsy.—In addition to the two forms of dropsy mentioned, cardiac and renal, we have serous transudation into the peritoneal cavity, occurring as the first feature of dropsy, and resulting from obstruction to the abdominal vessels, particularly the portal vein. This is termed Ascites, and in an adult man, when primitive, seems to be dependent on cirrhosis, cancer, perihepatitis, simple chronic atrophy, or syphilitic affections of the liver. Ascites, may, however, occur as a part of general dropsy, and in children also slight serous effusions into the peritoneal cavity may be seen in the course of acute diseases.

The nature of the *cause* which produces ascites occasions important varieties in the character of the effusion. Thus the colour may be dark brown, as in cirrhosis of the liver, or perfectly clear, as in chronic fatty degeneration of the kidneys. Between these extremes of colour all possible degrees exist. The quantity of solid constituents and the amount of albumen are from one to five per cent, and appear to increase with the length of time the effusion has existed. It would seem from the investigations of the observers (Hoppe-Seyler and Schmidt) that in primitive ascites the process is not one of simple filtration of serum out of the blood vessels, "that in fact the composition of the blood and the pressure in the venous radicles are not the sole determining factors. Some part in the formation and composition of the transudation must be ascribed to the endothelium and to the lymphatic vessels, although the exact *modus operandi* is not determined."

Special mention is required for a form of anasarca which seems to be induced by a "chill," and is ushered in with no other premonitory symptom. Thus a labourer engaged in mowing, and perspiring freely, rests for a little from his occupation and sits down in a damp meadow; or when employed in making a drain a man has the lower part of his body cold, while the upper part is warm. Under such circumstances the "chill" is caught, the

cutaneous secretion is arrested, and the extra work thrown on the renal organs induces congestion, and with congestion non-elimination of urine, and rapid development of anasarca. By some this is termed "inflammatory dropsy," and not unaptly, for the remedies suited for such a case are distinctly antiphlogistic.

Diagnosis.—Prominent and easily recognisable phenomena betoken the presence of œdema in the subcutaneous areolar tissue. The part so affected is swollen ; the skin loses its natural colour ; it becomes pale, and it may be tense and glazed. Pressure with the finger on the pale surface leaves an impress—*pitting*—which corresponds in duration with the pressure made and the extent of the œdema present. The *pitting* quickly disappears if the œdema is slight, but if considerable and of long standing, the skin loses its elasticity, and the process of obliteration of the pressure mark is slow.

The recognition of ascites is more difficult, and may be simulated by other abnormal conditions. Inspection, palpation, and percussion will, however, establish the diagnosis. For inspection shows that the abdomen is swollen and full. Palpation gives a sense of fluctuation apparent to the touch when the patient is laid on his back or sits upright and a hand is laid flat on one side of the abdominal wall, while a stroke is made with the other on the opposite side. The wave of the fluid is also seen visibly to cross with the impulse given. Percussion evidences that, in obedience to the law of gravitation, there is absolute dulness at the flanks, while the centre gives a clear tympanitic note from the air-filled intestinal coils. Percussion will also reveal modifications of sound, in obedience to the same law, on the change of position of the patient ; for if placed on one side, the fluid will gravitate to that, leaving the one uppermost free, and yield to the applied finger or plexi-meter clearness instead of dulness as before.

This varying percussion sound affords a diagnostic sign to distinguish ascites from ovarian dropsy. For in ascites the percussion sound varies with every change of attitude

on the patient's part; while in ovarian dropsy it does not, being limited to the side where the tumour is, and where the history of the case evinces it had its origin; additional means for establishing a diagnosis will be afforded by the presence or absence of morbid changes in other organs, as heart, liver, or kidney.

It may be further remarked that tympanites due to various causes may be confounded with ascites; but the percussion sound in the former is always loud and pronounced, both in front and sides. To distinguish it from distension of the bladder or pregnancy, the history of the case and the application of the catheter in the one instance, and the stethoscope in the other, are sufficient.

Treatment.—Without entering specially into the treatment of the different kinds of dropsy, it is to be observed that there are obvious indications—

1. To remove the fluid; 2. If possible to prevent its recurrence; and if neither the one nor the other is possible palliative measures are necessary.

Rest in the recumbent posture is of paramount importance, and the part in which is the greatest effusion must be elevated and supported. For this end raise the anasarcous limb and support the distended scrotum.

There are three great channels for getting rid of the effusion—the skin, the kidneys, and the intestines; and if the remedies employed to eliminate it by these organs fail, then tapping or puncturing must be had recourse to (F. 34*a*, 37*a*, 27).

INFLAMMATION

The old definition of inflammation by Celsus was thus expressed—

"Notae Inflammationis sunt quatuor, rubor et tumor, cum calore et dolore."

These are cardinal signs, but they do not explain the exact causes, and inflammation may therefore be defined as a series of changes in a part, identical with those pro-

duced in the same part by injury; and by injury is meant a chemical or physical irritant.

Tissue change thus underlies inflammation, and Whence is this tissue change? Does it emanate from the tissue itself, or is it the result of other causes being intruded upon the tissue? The answer to these questions is best solved by looking at what occurs when inflammation is set up in a part which can be carefully and microscopically examined during the inflammatory process. Thus, if the mesentery or the tongue of a frog is drawn out and placed under the microscope, inflammation occurs, and the tissue element may for hours be under observation.

What is then seen as the earliest change is dilatation, first of the arteries, then of the veins, the capillaries being little affected.

This dilatation is associated with quickening of the blood stream, which lasts for a varying time, and is followed by retardation. The blood current becomes slower and slower, and at last the stage of STASIS is reached, and remarkable phenomena are now seen in the circulation, especially of the veins. The red corpuscles and leucocytes in non-inflammatory conditions move on together in the blood current, occupying a central position. But in inflammation the leucocytes lag in their course. They attach themselves to the margin of the vessel, and form a marginal layer. But this is not all; as stasis becomes more developed the leucocytes pass through the vessel, and the passing through is observed first as a small projection, on the outer layer, attached by a narrow stem. This attachment is finally broken, and we see a colourless contracted body with one long process and several shorter, with one or several nuclei—in fact a LEUCOCYTE.

In process of time the outer surface of veins and capillaries, but not of arteries, shows several rows of leucocytes, evincing that emigration is not solitary but in numbers.

Other forms of exudation accompanying leucocytes constitute a *nidus*, on which they can nestle. This in the exposed mesentery of the frog reaches the surface;

and it forms the layer of false membrane seen in inflammation of serous surfaces.

Without detailing the experiments by which Cohnheim arrived at his conclusions, we may state that the migration of leucocytes and exudation, the result of stasis, are connected not with the blood or the cells, but are due to degeneration of the walls of the vessels.

But the migration of the leucocytes to their new quarters is not stationary. They multiply and increase, and form new cells, in the tissues they have invaded; and in this they are to a certain extent aided by the fixed cells of the tissues, which germinate and produce fresh elements.

The results of the exudation products are SERUM, MUCUS, FIBRIN, which by combination with leucocytes form lymph and pus. New growth takes place from the vessels in the form of vascular connective tissue, which in some cases assumes the special form of GRANULATIONS.

The exudations poured out, as the result of the inflammatory process, on serous and mucous membranes, differ in their terminations. In serous membranes they always coagulate. In mucous membranes they do not, as a rule, and probably this is due to some action of the epithelium; when, however, the epithelium is removed, a fibrinous layer follows, and the same result ensues from the application of a powerful irritant, as in croupous inflammation.

The product called INFLAMMATORY LYMPH consists of coagulated fibrin and entangled leucocytes, in varying proportions.

The inflammatory exudation, when the corpuscles greatly predominate, and the intermediate substance is liquid, is termed PUS.

The corpuscles of pus, fresh and newly formed, cannot be distinguished from leucocytes of the blood, for they exhibit active wandering (amœboid) movement, and continual change of form. When they develop in any quantity and accumulate and form an abscess, their wandering movements cease; they become dead.

In the formation of the abscess it is presumed that the tissue cells take an active part. The difference of tissues in which inflammation exists gives rise to various kinds of inflammation, to which distinctive names are given. Thus—

1. Catarrhal. On mucous membrane the exudation is not coagulable. It contains only detached epithelial cells, and a few leucocytes.

If, however, catarrhal inflammation is very severe, it becomes purulent, as in the specific inflammation seen in virulent conjunctivitis and gonorrhœa.

2. Croupous or Fibrinous. Croupous inflammation is that form in which coagulable exudation is formed upon a mucous surface. Diphtheritic inflammation is more than this, for it expresses some death of mucous membrane, as well as exudation on the surface.

The fibrinous form may be regarded as the usual kind of inflammation of serous membranes and connective tissue; and the term "croupous" is applied to certain inflammations, as in the lung, *e.g.* "Croupous Pneumonia."

3. Parenchymatous. This name has been given to the inflammations occurring in special tissues of organs independent of connective tissue framework.

4. The inflammation of connective tissue framework is termed "INTERSTITIAL," which again has subdivisions, as—

(*a*) Phlegmonous inflammation—acute interstitial, leading to abscess.

(*b*) Indurative inflammation, in which new connective tissue is produced in the interior of organs. This is chronic interstitial inflammation.

(*c*) Degenerative.

(*d*) Scrofulous. In this case inflammation, owing to a peculiar cachexia of those affected, is readily induced and heals slowly.

5. Infective inflammations are derived from pre-existing inflammations from which infective materials are

carried by the blood. Pyæmia is a type of infective inflammation.

6. Chronic. Inflammations are termed "chronic" when they do not tend to resolve but remain stationary. Chronic inflammations on mucous surfaces are distinguished by the persistence of a condition in the vessels, which permits exudation and cell formation.

In serous membranes chronic inflammations produce fibrous adhesions, with little or no liquid exudation. In interstitial tissue of solid organs chronic inflammations cause at first enlargement and afterwards contraction of the tissues, making them waste and diminish in bulk. This is the degeneration observed in cirrhosis of the liver and of chronic parenchymatous inflammation of the kidney.

DEGENERATION

This term is used in Pathology to express the condition in which a tissue or substance becomes replaced by some other tissue or substance less highly organised, different in composition, and more unfit for the performance of its original functions.

This change may be effected by chemical metamorphosis, as of albuminous into FATTY material; by infiltration of the tissues with some new material, as AMYLOID; or by the substitution of a newly-formed tissue, inferior to the original in organisation or efficiency, as in FIBROID degeneration.

The following kinds of Degeneration are recognised by Pathologists:—Amyloid, Fatty, Mucoid or Colloid, Parenchymatous, Calcareous, Pigmentary and Fibroid.

1. AMYLOID (*Synonym*, Waxy, Lardaceous, Albuminoid Degeneration).—This degeneration is associated with exhausting diseases, where purulent discharges, long continued, weaken the strength of the patient; or where a former disease has deteriorated the constitution, as syphilis or ague; or some more obscure cachectic condition.

The organs affected are chiefly the liver, spleen, and kidneys, lymphatic glands, intestinal mucous membrane, especially the villi; more rarely the suprarenal bodies, pancreas; exceptionally the thyroid body and generative organs.

The organs affected are generally increased in size, and in advanced cases present a peculiar blanched appearance, like beeswax. If the tincture of iodine is applied to organs with albuminoid disease, a brown-yellow or mahogany colour is the result. A further change is occasioned if the iodine-discoloured parts are treated with dilute sulphuric acid—then a purplish-black colour forms. These changes are due to the existence in the tissue elements of a peculiar substance allied to the albuminates, and containing, when approximately pure, about 15 per cent of nitrogen. Virchow erroneously considered the change, from its characteristic colour when acted upon by iodine, as due to starch; hence the term "Amyloid," still retained in Pathology.

The general symptoms of amyloid disease during life are failing health, waxy appearance of the face, general debility.

In the case of the liver there is detected uniform smooth enlargement; and in the kidney the albuminuria and dropsy are of so peculiar a character as to distinguish this form from other chronic diseases of the organ.

2. Fatty Degeneration.—In fatty degeneration the organ is increased in size; the consistence is reduced, sometimes, as in the brain, to a pulpy state—the colour being changed to a yellow or buffy hue. When cut into a greasy stain is left on the knife, and in advanced cases, as in liver disease, a portion of the organ thrown into water will float.

The microscopical characters of this degeneration, as seen in the heart and walls of capillaries, are first loss of sharpness of individual muscular striæ, and the appearance of minute quantities of oil between the elements. When

the process is advanced the whole of the fleshy substance is replaced by fatty particles, contained in an albuminous envelope. Finally the degenerated fibres become atrophied through absorption of the fat; or suffer rupture, with discharge of their contents.

In "white softenings" of nervous tissue the nerve cells and the nuclei of the part are converted into granular corpuscles; and when these break down into a fatty condition a creamy consistence is assumed.

It was at one time supposed that the fatty change was due to the blood depositing oily materials, but later investigations, especially of Sir Richard Quain, have conclusively shown that the nitrogenous materials of the tissues themselves, and not the blood, are the "fons et origo mali," and further this change is dependent on interference with nutrition, and especially with the process of oxidation.

3. Colloid or Mucoid Degeneration.—This degeneration is associated with a peculiar morbid product resembling glue or jelly, and is observed in some forms of cancer or new growths. It is more particularly referred to under Cancer, p. 130.

4. Parenchymatous or Granular Degeneration, also called Cloudy Swelling, is a peculiar change met with in some epithelial structures, especially the liver and kidney cells, and occurring in connection with some diseases of organs in typhus, typhoid fever, scarlet fever, diphtheria, and pyæmia. The naked-eye appearance is like that of fatty degeneration, but it is distinguished from this by the solubility of the granules in acetic acid, and their insolubility in ether. This degeneration is supposed by some authorities to be due to the high temperature observed in the diseases mentioned, and by others it is simply regarded as dependent on post-mortem changes.

5. Calcareous Degeneration.—This degeneration

partakes more of the nature of an infiltration than degeneration, for the normal tissues are infiltrated with the deposition of calcareous particles, while there may be no alteration in the tissues themselves, except what exists from the infiltration retarding the circulation or growth of the parts affected.

6. Pigmentary Degeneration.—This is observed in the pigmentation of the spleen after intermittent fever, and it is also seen in chronic venous congestion following a fibroid degeneration.

7. Fibroid Degeneration.—This is the result of chronic interstitial inflammation, as the result of which the original tissue is replaced by a form of connective tissue. It is first observed that cells of a lymphoid type penetrate the tissue and become slowly organised. This ultimately leads to induration, contraction, and partial atrophy. Fibroid degeneration is further referred to under Diseases of the Lungs.

BACTERIOLOGY

Micro-Organisms

Bacteriology now bulks largely in medical literature, and in many points threatens older ideas as to the causation of disease. It seems to me, therefore, to be necessary to give the student some leading statements, culled from authorities on this subject.

Bacteria are vegetable cells, the lowest members of the vegetable kingdom, and are most closely allied to the lower forms of Algæ. They possess constancy of form—that is to say, although they may vary more or less in outward appearance in varying circumstances, yet each species has always a certain definite form marking its complete development. Many elongated bacteria, *e.g.*, reproduce themselves by the formation of spherical spores, but these spores seen by themselves are not to be regarded as *varieties*, they are merely immature, undeveloped bacteria. In like manner pathogenic bacteria, *i.e.* bacteria

which, when introduced into a healthy organism, cause it to become diseased, can each occasion one, and only one, kind of disease. They cannot, as Nægeli supposed, be so varied in the course of generations as to cause at one time putrefaction, at another a specific fever, at another cholera. No doubt we can in some cases, by altering their environment, deprive these pathogenic bacteria of their noxious influence, but we cannot further change them, so that they will give rise to a different kind of disease.

Bacteria have (*a*) a *cell wall*, consisting of material allied to the carbohydrates, which sometimes swells into a gelatinous mass uniting two or more bacteria together; and (*b*) a *cell content* of granular protoplasm devoid of a nucleus.

They multiply by division, or by the formation of spores. The spores are surrounded by a thicker and stronger cell wall than are the bacteria from which they develop, and are able to withstand to a much greater extent extremes of heat, cold, drought, and the like.

In a favourable environment bacteria grow and multiply very rapidly, but as the result of vital processes they give rise to chemical products, usually of the nature of an alkaloid, which are alike antagonistic to the life of the micro-organisms themselves, and of any vital tissues with which they may come into contact. Thus they excite putrefaction and fermentation, and when developing in the living organism occasion the pathological changes characteristic of Infectious Diseases.

At the present stage of our knowledge we can definitely state that three forms of bacteria are recognised—

Globules (Micrococci).
Rods (Bacilli).
Spirals (Spirochætæ or Spirilla).

We shall here briefly give a description of these forms, and treat of special distinctions when the diseases in which they occur are more fully explained.

1. *Micrococci.*—These are round or oval cells, rarely exceeding $\frac{1}{20,000}$ of an inch in diameter, often much smaller,

single, in pairs, or in chains of four to twenty or more cocci. The chains may be straight or wavy. Micrococci exhibit the Brownian movement, but none have been observed with cilia or the power of locomotion. They do

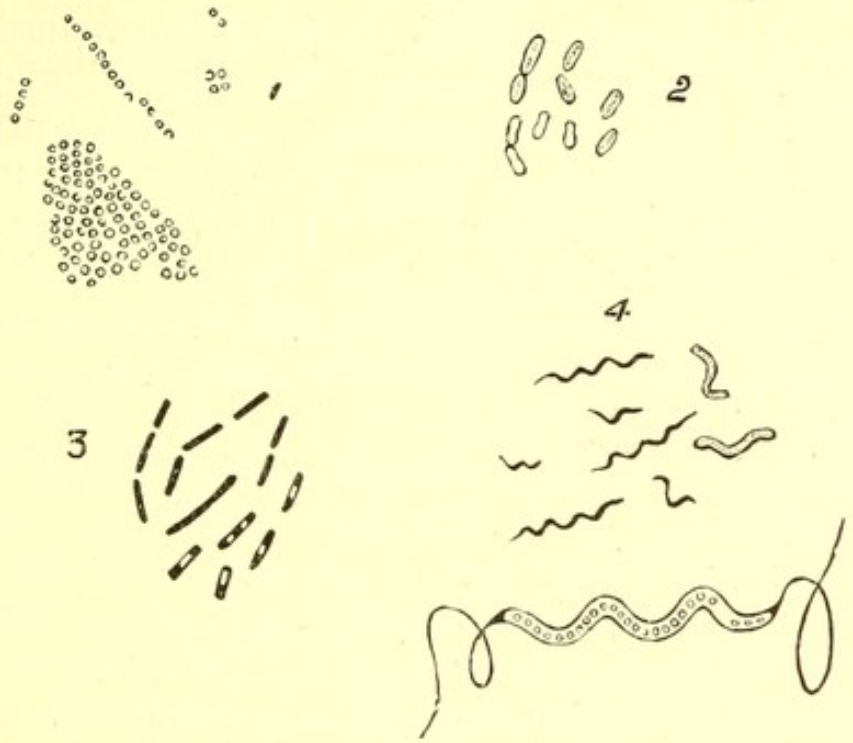


Fig. 4.

1. Micrococci. 2. Bacteria. 3. Bacilli. 4. Spirilla.

not cause putrefaction, although they are frequently found in putrefying fluids. They are always found in the pus of *acute* abscesses, and it is generally conceded that all acute suppuration is due to micrococci. They may not be found in a chronic abscess.

Present research has conclusively proved that a special micrococcus originates Erysipelas, and Löffler has contended for the existence of a special micrococcus in Diphtheria. In Pneumonia, Klebs, Koch, and Friedländer have stated that a micrococcus exists in the exudation and also in the lymphatics of the lung, and other observers have found it in the blood and blister-fluid of patients with this disease. But it has also been detected in cases of Empyema, and in the exudation of the Cerebro-Spinal Meningitis coming as a complication of Pneumonia ; so that further investigation is necessary to determine the

question if a coccus can be regarded as the real cause of pneumonia.

2. *Bacilli.*—There is no doubt that a specific bacillus is associated with Anthrax and with Glanders. There is also little hesitation in accepting Koch's view of a specific bacillus "as the one and only cause of Tuberculosis, and that without its existence Tuberculosis could not originate."

The bacillus of Leprosy has been cultivated artificially outside the body, and it can now be positively affirmed that it originates this disease. Though the descriptions of observers do not exactly agree as to the bacillus of Typhoid Fever, yet it may be assumed from experimental research that this disease is associated with a specific bacillus.

3. *Spirillum.*—The spirillum was first noticed by Obermeyer in the blood of a patient suffering from Relapsing Fever, and it has since been seen by many observers. It exists in the blood, and it can be conveyed by inoculation from man to man, and from man to apes.

To Koch belongs the honour of having first discovered the micro-organism which causes Cholera, and hence it has been generally termed Koch's Cholera Bacillus. The peculiar construction which gave it the name of "comma bacillus" is now rather considered as a stage in its life history, and indicates that it should really be classed as a spirillum.

Other common forms of micro-organisms causing disease in man are of the Fungi order, growing in the cutaneous structures or on mucous surfaces. Tinea Favosa or Favus is due to the Achorion Schönleinii, Ringworm to Trichophyton tonsurans, Tinea versicolor to Microsporon furfur. On the mucous surfaces of the mouth and pharynx the Oidium albicans causes Thrush.

To determine whether any given organism is the cause of a disease, the following are the chief points necessary for proof:—

(*a*) A definite form of organism must always be found in the blood or lymph or in the affected parts of the animal body.

(*b*) The micro-organism must be isolated from the blood, lymph, or tissues, and be cultivated in suitable media outside the animal body. These pure cultivations must be carried on through successive generations of the organism.

(*c*) A pure cultivation thus obtained must, when introduced into the body of a healthy animal of the same species, produce the same disease.

(*d*) In the inoculated animal the same micro-organism must be found.

Crookshank justly says of these conditions: "Though we may accept as a fact the existence of pathogenic organisms, we are not yet in a position to assert the means by which they produce their deleterious or fatal effects."

FEVERS

We now take up the first great class of diseases—viz. Fevers, of which Graves says, "In the whole range of human maladies there is no disease of such surpassing interest and importance as fever." The knowledge of fever in the abstract is essential for the proper treatment of all diseases, and hence it is, doubtless, that the literature of fever is so varied and voluminous.

The old physicians said—"Essentia vero febrium est præter naturam caliditas." And they were led to this definition by feeling the skin, which they recognised to be warm—warm above the natural temperature of the body—warm above what is consistent with health. In late years we have been enabled to estimate more accurately than they did this increased warmth, by means of the clinical thermometer, which may be placed in the rectum, vagina, mouth, or axilla. For obvious reasons the latter is the site generally chosen. If the bulb of the thermometer is placed in the axilla, and kept there from ten to fifteen minutes, it will be found in health to register 98·6° F., or if it is placed in the rectum or vagina,

it may rise to 99° F., or even a little higher.[1] Certain circumstances may occasion a variation from the points mentioned, and yet health may be retained. What circumstances are these? 1*st*, Long exposure to great heat or cold. 2*d*, Climate. The average temperature in tropical climates is greater than in temperate; *e.g.* it may reach 99·5° or even 100° F. 3*d*, Food and drink. After a full meal the temperature first falls, then it increases as digestion goes on. Fasting lowers the temperature, and the taking of alcohol first causes a fall which does not last long, for it requires a considerable amount to have any material influence. 4*th*, Exercise also increases, while prolonged study causes a slight depression.

Aware of the existence of these circumstances, and bearing them in mind, the student may confidently assume that if these conditions do not exist, and yet the temperature remains persistently above normal, he has then undoubtedly to do with the state called Fever. It must be remembered, however, that increase of temperature is associated with many of the acute affections subsequently to be considered; and the student must not *ipso facto*, from mere thermometrical indications, and without carefully weighing probabilities, consider that he has to do with one or other of the specific fevers. In fever, as in all acute diseases, the temperature should be carefully taken *at least* twice daily, and in hospital a chart, containing the daily result from the commencement, hung up in a convenient situation near the bed.

In accordance with what has been stated, Virchow's definition of fever is the best, as it is the shortest—viz. "That it is that state of the body in which there is an increase of temperature above the normal."

Acknowledging Virchow's definition of fever as the best, the question may now be asked, Why is there an increase of temperature? Facts seem to show that it is connected with the loss of nervous control, which in health guards the oxidation of tissue. This control is in abey-

[1] For daily practice the dial-shaped self-registering thermometer of Emisch can be recommended.

ance, but in what manner is still a matter of hypothesis, although it may be fairly assumed that bacilli enter the blood and affect nervous centres, or fever may originate by disease directly operating on these centres. These two suppositions are supported by the facts that discharges from wounds—the results of surgical operations—may be absorbed into the system and induce fever, while injuries to the nervous centres—the results of blows or falls—may cause an increase of temperature even without external open wounds. The balance of health in both cases is changed, and fever commences, as thermometric evidence plainly reveals. The treatment of fever will be alluded to afterwards, under the several diseases in which it manifests itself. Still, speaking generally here, it may be stated that the first object of treatment is to remove the cause; and secondly, to act on the fever by methods which reduce the temperature. These latter methods are various, and have changed greatly with the advance of our knowledge in therapeutic measures. Old medical works testify how freely in fever venesection was practised, when the bodily heat rose above the normal. Now blood-letting is practically abandoned, and other and less heroic methods are put in force. Thus purgatives are useful at the outset, and so also are diaphoretic and diuretic remedies. These act favourably by removing the increased products of tissue waste, and promoting by perspiration a healthy action of the skin.

Of special measures may be mentioned the COOL and COLD bath. The "cool" bath may be employed at a temperature of 70° to 80° F., in great hyperpyrexia in typhoid fever; the "cold" bath is essential in some forms of rheumatic fever, or in injuries to the brain.

Some alkaloids have the power of checking fever. Without discussing the physiological causes explaining this, it may be stated that quinine notably effects reduction, when given in large doses of ten, twenty, or thirty grains, in twenty-four hours, by the mouth or hypodermically. Antipyrin acts similarly. Salicin and salicylic acid, unless the heart is implicated, specially check rheumatic fever.

Aconite seems to have a different action from quinine and salicin, for it antagonises the fever by depressing the circulation. In the early stage of catarrhal fever—the result of a chill—or of local inflammation, the administration of tincture of aconite, in minim doses every five minutes until 30 minims have been given, markedly promotes improvement.

In pneumonia or enteric fever, when the disease is fully established, although quinine may be given, aconite is contraindicated, for its action directly goes against the great object of treatment, viz. supporting the constitution until a crisis or lysis is reached.

In this country there are four kinds of continued fever—

1. Simple Fever or Febricula.
2. Typhus.
3. Typhoid.
4. Relapsing.

SIMPLE FEVER OR FEBRICULA is non-contagious, and depends frequently on errors of diet, exposure to the sun or cold, or other insanitary agencies which may fatigue or weaken the system.

Symptoms.—Following on one or more of these causes, without almost any warning, the patient becomes languid and disinclined for either mental or bodily work; the appetite is lost, and headache ensues; a dull aching pain is felt all over the body, especially at the back, accompanied with "a creepy cold sensation" difficult to define.

This creepy cold sensation is followed, in the course generally of a few hours, by increased heat of body (fever), rapid pulse, furred tongue, and scanty, high-coloured urine. Delirium through sleeplessness may supervene, and the state of matters may seem very alarming, when, after an interval of three or four days, there is a crisis. The pulse falls, the skin becomes moist, thirst abates, headache ceases, and a copious perspiration terminates the fever. The patient is left weak, yet convalescent, and the strength gradually returns.

Diagnosis.—By exclusion of other specific fevers as

the cause of the rise of temperature, no vomiting, no pain of back as in small-pox; no sore throat as in scarlatina; no sneezing or cough as in measles. Stethoscopic examination does not reveal anything wrong with the chest, and thus a detectable pneumonia is excluded. Sudden onset excludes typhoid, and if no epidemic of typhus or relapsing exists, these fevers also are absent. It may be added that its division into "catarrhal," "bilious," "mesenteric," and "brain fever" seems unnecessary.

Treatment.—The indications for treatment, since the fever terminates in recovery, may be summed up in a few words. At the commencement give a saline purgative of sulphate of sodium and sulphate of magnesium, or a Seidlitz powder. After the bowels have acted, employ a diaphoretic or diuretic mixture; or 1 minim doses of tincture of aconite may be given every five minutes in water until 30 minims have been administered (F. 31, 40). A tepid bath, or placing the feet in mustard and hot water, may hasten the crisis of simple febricula. The patient has no inclination for solid food, and should not be urged to take anything but a sloppy diet, as arrow-root, milk-gruel, etc. Convalescence is to be assisted by nourishing food, such as beef-tea, chicken-soup, and wine. A tonic mixture is also serviceable (F. 75, 76, 77).

To understand properly what is to follow, it may not be out of place to give a short historical account of the two great continued fevers of this country—*typhus* and *typhoid*. Formerly the word "typhus" included a group of diseases, but as morbid anatomy became more studied, it was attempted to explain typhus by an anatomical definition. This was especially the case in France at the beginning of the present century; it being found that cases like typhus presented characteristic lesions in the ileum and mesenteric glands. It was therefore supposed that all cases of typhus would show these characteristic lesions, and much disappointment ensued when it was discovered that there were instances of typhus which a post-mortem examination failed to explain. So, gradually, French and English physicians were reluctantly compelled

to admit that the cases seen must belong to different categories. And hence it became necessary to use the term typhoid (like typhus), and although objections may be urged against its employment since the diseases differ so materially in their symptoms, progress, and terminations, yet it is doubtful if a better one can be established without being open to grave theoretical objections. For its synonym, "enteric," conveys the impression that the inflammation of the intestine is the cause of the fever, whereas in point of fact it is the result. So also "pythogenic," as applied by Dr. Murchison, implies that putrefactive changes, simply as putrefactive changes, can produce the fever—a conclusion which many deny.

Although the controversy which so long raged has now been practically settled, it seems impossible to doubt that these fevers presented distinctive characters from the earliest ages, although their anatomical differences and clinical history were only elucidated in recent years. For it can scarcely be supposed that typhoid did not exist as well as typhus long ago. Its non-detection is probably due to the looseness and the carelessness displayed in recording the results of pathological observations. All intestinal ulcers were at one time classified under the term Dysentery, and very probably typhoid epidemics were simply treated and styled dysenteric epidemics. In the seventeenth century descriptions of cases, with accounts of post-mortem examinations, leave little doubt that typhoid fever was then widely spread in Europe. Such reports were given by Spigelius in Italy; by Willis and Sydenham in England; by Hoffman in Germany. In the eighteenth century its existence can be proved with certainty, for Morgagni describes a case with ulcers and perforations in the ileum and beginning of the colon, with swelling of the mesenteric glands and of the spleen. So, also, other cases were reported with more or less minuteness, until, at the beginning of the present century, the French described epidemics of typhoid fever with constant intestinal lesions.

It was reserved for Bretonneau of Tours, in 1820, to

prove that the disease was always localised in the solitary and agminated glands of the ileum. He also was the first to maintain that it depended on the action of a poison, which was communicated from the sick to the healthy; and, carried away by the discovery, he and subsequent French observers deemed it identical with the contagious typhus seen in camps and following armies. Then there came to be a wide division in the views of French and English pathologists—the former rarely failing to find the intestines diseased in continued fever, while the latter saw them healthy, and regarded the intestinal lesion as a mere accidental complication. So the controversy raged for some years, and it appeared puzzling to candid inquirers how eminent and truthful observers should record such seemingly discordant facts.

For it would appear clear, either that the intestine was diseased, or that it was not. It was or it was not the seat of ulceration. In 1835 Dr. Perry of Glasgow very nearly guessed the whole truth that the fevers were essentially distinct, though he admitted that the one might pass into the other. He was followed by Dr. Lombard of Geneva, and Messrs. Gerhard and Peacock of Philadelphia, who stated "that the distinctive characters of the two diseases were such as in practice could not allow them to be confounded." In 1841 Louis in his great work on typhoid fever, admitted "that the typhus fever of the English is one very different from the one he is now describing—viz. typhoid." Notwithstanding this, the doctrine of non-identity did not remain unopposed, for different schools propounded different doctrines.

Much of the remaining doubt was, however, dispelled by the researches of Sir W. Jenner, published between 1849 and 1851. Not merely did he state the differences observed during life, but by an analysis of carefully recorded cases he showed the distinctive post-mortem features of typhoid. He also demonstrated that the two fevers were dependent on different causes, that the one did not communicate the other, and finally concluded by stating "that typhus and the so-called typhoid fever were

as distinct as any of the exanthemata"—an opinion which all subsequent observations have tended to confirm.

After these remarks we now take up the separate consideration of the different fevers, commencing with

TYPHUS FEVER

This fever was, as has been indicated, formerly called putrid, pestilential, ship, or hospital fever, and it derives its name from the Greek word τυφος, smoke. This fever is contagious, usually epidemic, and most frequently follows, or is the direct result of, destitution, overcrowding, and bad ventilation. It is eminently a disease of the poor.

Symptoms.—The incubation of typhus fever is of variable length, but usually it is from one to twelve days or even longer; during which time the health generally appears to be perfect. The onset of the disease is sudden and is attended with headache and pains in the back and limbs. The patient feels chilly or may even shiver, and is disinclined for any exertion. The tongue is large, pale, coated with fur, and the bowels are constipated. Prostration increases, and by the third or fourth day he gives in and takes to his bed.

On the fourth or fifth day a characteristic eruption appears—the *Mulberry rash* as it was named by Sir William Jenner. It consists chiefly of irregular spots, sometimes single and easily defined, at other times patchy from a number of them coalescing. They are most frequently seen on the limbs and trunk, rarely on the face. The dark red colour fades after a day or two into a brick-dust hue or mottling, which appearance increases until the rash becomes ecchymosed or hæmorrhagic, and in this later stage does not disappear on pressure, but remains permanent even after death, or until recovery ensues. Petechial spots on the backs of the hands are of great significance as pointing to typhus. The rash comes out ONCE FOR ALL (not gradually), from the

fifth to the eighth day of the fever, and is rarely absent in adults, although in young children it is not so constantly observed. In addition to this rash characteristic of typhus fever, there is also peculiar to it a dull, heavy, stupid expression of countenance. The eyelids droop, and the eyes have the appearance of those of a man recently recovered from a debauch.

With the fever there is generally delirium. This rarely comes on before the end of the first week, and usually continues until death or convalescence supervenes. The delirium is of a violent and painful character, and at first is not continuous. The patient can be roused to answer questions, take drinks, or show his tongue. Yet his expression is vacant, and he mutters when alone. Generally this stage is succeeded by a loss of cognisance of external objects, and by various delusions, especially during the night. The patient tosses about from side to side, or he may shout madly, or endeavour to get out of bed. The mind is, in one word, thoroughly unhinged.

The temperature rises in the first week to 104° or 105°, remaining about these points for a week, and then on the twelfth day there is usually a decided fall and the crisis is completed by the fourteenth. The rate of the pulse varies little from day to day, but its general tendency is to become more rapid. Its volume and force decline, until in severe cases it is very feeble and even imperceptible. Progressive weakness is noted by diminution or loss of the heart's impulse, with disappearance of the first sound. For several days, even when recovery is to take place, it is often impossible to feel the heart beating, and with the stethoscope only the second sound can be heard.

The tongue in the first week is very foul; in severe cases during the second week it becomes dry, brown, tremulous, and is protruded with difficulty, while the teeth and lips are covered with sordes, emaciation all the time going on, with tendency to contraction of the pupil, cold extremities, and congested conjunctivæ. In favourable cases the disease usually terminates on the fourteenth

day from the commencement of the fever by a "crisis," which is ushered in by profuse sweating, a prolonged sleep, or diarrhœa; or more rarely there is no marked crisis, but rather a gradual subsidence of pulse and temperature ("a lysis").

Should a fatal termination ensue, it usually happens between the twelfth and the twentieth day of the fever, death being preceded by great prostration, hiccough, picking of the bedclothes, *subsultus tendinum*, involuntary passing of fæces and urine, and coma. The mortality is about one in ten of those attacked, and the greater the age above ten years the greater the danger.

Complications and Sequelæ.—The complications include pneumonia, pleurisy, passive congestion, and gangrene of the lungs, bed-sores, phlebitis, and embolism. Occasionally inflammatory swellings form in the parotid and submaxillary region, and go on rapidly to suppuration. Mania sometimes sets in during convalescence, but it is not as a rule permanent; and hemiplegia, with or without aphasia, is an occasional sequela.

Diagnosis.—The rash and the nature of the fever distinguish typhus from any inflammatory condition of the lungs.

Its further diagnosis from typhoid will be alluded to afterwards. Acute meningitis, for which it has been mistaken, is attended with nausea and vomiting, no rash, and delirium almost from the commencement.

Morbid Anatomy.—There is nothing characteristic in the post-mortem appearances of a fatal case of typhus fever. If there has been marked delirium we may expect to find the cerebral sinuses engorged; but in the majority of cases the brain is seldom altered. The spleen is softened, and in some cases enlarged. The heart may be somewhat atrophied, and the blood "dark and fluid." Should there have been an inflammatory condition of the lungs, indications of this will of course be found on examining the thorax. The intestinal tract is healthy.

Treatment.—As in all epidemics of contagious diseases, the first cases are to be watched with special care, if

possible placed in separate hospital wards, and the clothes and effects disinfected. In the early incubatory stage, Dr. Hughes Bennett recommended an emetic, which he said had saved him from one or two attacks, when he was certain the poison was in his system. If this stage be over, we must treat symptoms, remembering that we may guide, but can never cure a fever. A purgative of thirty to sixty grains of rhubarb may be given at the outset. Tepid water injections relieve after-constipation. The apartment should, if possible, be large and well ventilated, with a fire in the room. Intercourse with friends should be restricted, and attendance limited to skilled nurses. The head should be shaved, or the hair teased out, and cold lotions applied. The diet should consist chiefly, but not necessarily solely, of milk and weak broth, given in small quantities every two or three hours, in all five to six pints of milk daily.

The following general indications[1] with regard to the use of stimulants may thus be summarised :—Do not be in haste to begin them, and do not assume that, once begun, it is necessary to continue them all through the fever. Few do well with stimulants at the beginning of the continued fevers ; as a rule they do harm until after the end of the first week, but much will depend on the type. Be guided in giving them by the type of the fever and the particulars of each case. Remember that signal loss of strength, rapid feeble pulse, and weakness of the first sound of the heart, are indications for their employment. If after the first dose the fever is increased, the temperature rising higher, and if the patient becomes restless, withhold the stimulant. But if he shows less languor, if the delirium is diminished, if the pulse becomes fuller, if the tongue is moister, if sleep comes on, and if the patient is easily roused from slumber, and sensible when roused, alcohol is beneficial.

The dose cannot be exactly regulated. You may begin with a dessertspoonful of brandy or whisky diluted, and,

[1] These indications with regard to alcohol are general, and not limited to fever, but apply also to acute inflammatory conditions.

if well borne, this may be continued, as circumstances require, every two or three hours, commencing in the morning. If wine is preferred, remember that sherry is most palatable, and that port is not better than other wine unless there is diarrhœa. A mixture of chloral and bromide of potassium is beneficial, especially at the approach of the crisis, if there is great irritability and sleeplessness (F. 69).

How are you to prevent bed-sores?

Carefully look at points most exposed to pressure. On a suspicious blush appearing, rub up alum with white of egg and brandy, and apply it over the part, or wash the part morning and evening, and apply glycerine cream. If, through carelessness or ignorance, they have formed, the slough may be removed by a charcoal poultice, and then iodoform should be dusted over the sore or sores. Undue pressure should be avoided by pledgets of lint or cotton-wool secured by sticking plaster; or, better still, put the patient on a water-bed.

The pulmonary complications are frequently relieved by hot poultices covered with oiled silk and the internal use of ipecacuanha wine first, followed, if necessary, by carbonate of ammonium. If the symptoms subside, these remedies must not be continued, as their tendency is to weaken the patient.

The excessive thirst may be obviated by cool drinks in abundance, water, lemonade, carbonic acid water, particularly that which has been made with distilled water.

Cold sponging is rather pleasant than useful, but high authorities recommend cool baths at about 87° F., repeated day and night if the temperature rises above 103° F. They are said to be generally well borne, and meet with no opposition from the patient, as soon as a few have been taken. In employing them it is not to be supposed that the patient is to be carried into a bath-room and then moved back to bed, but that a full-sized bath is placed near to his bed, into which he is carefully lifted. A sheet is placed hammock-wise in the

bath and secured. Upon this he reposes while a large oiled silk covering prevents unnecessary exposure of the person.

TYPHOID FEVER

The *bacillus* of typhoid fever has been noted by various observers—as Eberth, Koch, Coats, Fränkel, and Gaffky. It consists of rods in length equal to one-third the diameter of a red blood-corpuscle, and occasionally forming threads of greater length by the aggregation of several segments. They are about three times as long as they are broad, and rounded off at their extremities. They do not stain like tubercle bacilli, and in relation to other bacilli they do not stain so uniformly or so decidedly as other forms seen in various diseases.

When this micro-organism has been experimentally communicated to animals it causes them to manifest the symptoms of typhoid; and the researches of Fränkel, Simmonds, and Seitz seem to leave no doubt as to its pathogenic character.

As to the exact manner in which it enters the system different views are entertained, which centre chiefly in the adoption or negation of the "ground soil" or "the drinking water" theory. To discuss these views at length would occupy too much space and besides lead to no practical result; for we cannot deny its origin being sometimes spontaneous, and we are forced to conclude that, in ways unknown to us, bad drains, sewer gas, or contaminated fluids may at times originate the disease. However generated, there is little doubt that the small intestine gives the nidus on which the poison rests and lives, and then proceeds into the mesenteric glands, the blood current, the spleen, and other organs. The liability to disease is markedly influenced by age and season, terror of contagion, and errors of diet. Statistics evince that it specially affects both sexes from ten to thirty years, and that above and below these years it is comparatively rare. They also show that typhoid

epidemics are most apt to develop when fruits, ripe or unripe, are principally taken, as during the months from August to November, while they are fewer from December to April. The term typhoid means "like typhus," and the fever has also been named enteric, gastric, or pythogenic.

Symptoms.—The patient is attacked by the disease more insidiously than in typhus. There is no abrupt departure from health to disease. There may be a slight premonitory chill, followed by *malaise* and inability or aversion to work. The man feels out of sorts, and attends listlessly to his business; the child inclines to rest, and not to play with its toys. Then lying in bed is found to be a welcome relief, and there is no inclination to leave it. At the early stage of typhoid, as well as during the whole continuance of the fever, the thermometer is found to be of great value. Thus, even although the pulse indicates little deviation from health, it will be found that the evening temperature is higher than the morning by about a degree—99·9° F. morning, 100·5° F. evening; and this characteristic of a high evening temperature compared with that of the morning is retained throughout the disease. The temperature rises gradually, and may reach 105° F. towards the end of the first week; in the second week the fever is continuous; in the third the fever begins gradually to fall; in the fourth the temperature usually becomes normal, but this varies, in some cases the pyrexia lasting for an indefinite time after the other symptoms have gone. The pulse averages from 90 to 110. When it keeps at 140 in adults it is always an unfavourable symptom. The pulse and temperature do not always correspond; for sometimes, although fever exists, the pulse may be normal or subnormal. Marked irregularity of the pulse, independent of mental excitement or slight bodily exertion, is always a grave symptom, though this irregularity may pass off and the patient recover. The *quality* of the pulse after some duration of the fever feels relaxed and soft, easily compressible, and dicrotism or

duplication of the pulse can be appreciated even with the finger. When this dicrotism is striking the nurse may count twice as many beats as there really are. The general symptoms of fever are present—as thirst, loss of appetite, and headache. The tongue loses the colour of health, and becomes small and dry, having a pale brownish-yellow fur, with red tip and edges.

About the seventh or eighth day of the fever small rose-coloured spots sometimes, but not invariably, appear on the abdomen, chest, or limbs, being situated on normal uncoloured skin. They may be few in number or numerous, and are raised to the touch. Their form is circular, and they last about three days, disappearing completely under pressure, to reappear when that is removed. Fresh crops succeed those previously formed, perhaps until the termination of the fever. They are rarely seen after the thirtieth day unless, as not unfrequently happens, a relapse occurs.

The abdomen becomes somewhat enlarged, and on careful pressure over the right iliac fossa a gurgling sound is generally heard, with distinct wincing or even actual pain. Even when delirium is present, this wincing is usually seen by looking at the face.

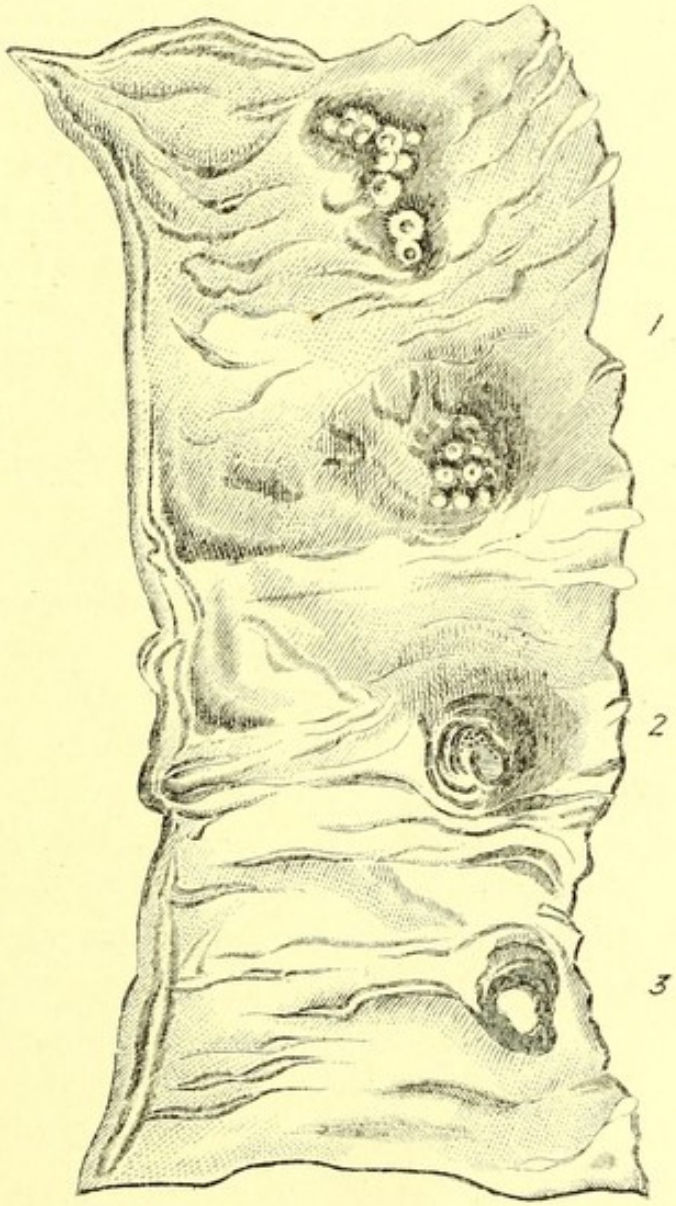
Diarrhœa is usually present. In some cases the stools are numerous, in others only two or three in the day. The colour of the stools is characteristic, and best described as often like Pea-Soup, but sometimes, especially in severe cases, representing chopped green vegetables in a watery fluid. Occasionally the stools contain blood, in quantity varying from a mere tinge to a pint or more. With diarrhœa there may be marked distension of the abdomen and tympanites.

Course and Progress of the Disease.—In mild cases symptoms of amendment may appear in the middle of the *second week*, but in severe cases the temperature remains high, and in the beginning of the *third week* somnolence may supervene, sometimes interrupted by delirium. "This delirium is more acute and noisy than that of typhus, but it is not continuous, and during the

intervals of delirium the patient may be rational and conscious, or more or less confused ; or he lies motionless in bed with his eyelids closed, yet replies to questions, though the answers are inarticulate and unintelligible. Day by day the strength is lost, the tongue is dry and brown, the pulse feeble, the delirium low and muttering, tremors and involuntary evacuations occur. Death may now take place by coma, or improvement may begin from the end of the third week. In the majority of cases there is no delirium, but it is to be remembered that in such cases danger is not past from pulmonary complications or from peritonitis consequent on perforation, or from the exhaustion of great diarrhœa or uncontrollable hæmorrhage," and during convalescence from bed-sores or thrombosis of the femoral vein, with the attendant liability to pulmonary embolism.

Morbid Anatomy.—Characteristic traces of the disease are found after death, and are pathognomonic of typhoid fever. These are altered appearances of Peyer's patches, solitary follicles, and the adjacent mesenteric glands ; and the lesions are most distinct in the groups of glands nearest the ileo-cæcal valve. In the earlier stages the Peyer's patches are congested and swollen, and may be found projecting above the level of the mucous membrane like buttons. The surface of these raised patches may later on be eroded and ulcerated, and portions of them may slough away, exposing the muscular and even the peritoneal layers. The ulcer has sharply-defined edges, and may vary in size and shape. Perforation of the thin floor of the ulcer is one cause of a fatal termination to the disease. The cicatrices left after these ulcers have healed commonly disappear after a few years. The mesenteric glands are swollen, and the spleen is usually much enlarged and very soft.

Diagnosis.—Typhus and typhoid fever are both distinguished from febricula and relapsing fever by the longer continuance and course of the fever, along with the characteristic eruptions, and from one another by the following symptoms :—



TYPHOID ULCERATION OF THE ILEUM.

1. SWELLING OF PEYER'S PATCHES.

2 & 3. ULCERATION & PERFORATION.

1. In typhus the rash is mulberry-like, mottled, and continuous, going on to ecchymosis, and hence resisting pressure. In typhoid the rash consists of rose-coloured spots fading in three days, and giving place to a fresh crop. These spots disappear on pressure, and are not surrounded by mottled skin.

2. In typhus the rash appears from the fifth to the eighth day; in typhoid between the seventh and the fourteenth.

3. In typhus there is no diarrhœa. In typhoid diarrhœa is common, and the stools are of a pea-soup colour.

4. In typhus the symptoms are generally cerebral; hence disquietude going on to coma, with an intermediate stage of delirium. In typhoid the symptoms are abdominal; hence diarrhœa, and pain on pressure over right iliac fossa. In typhus we see contracted pupils, muttering delirium preceded by disquietude and uneasy manner, and *congested conjunctivæ*. In typhoid we see dilated pupils, delirium preceded by apathy and somnolence, and *no congestion* of the conjunctivæ.

5. These fevers also differ in their duration, a crisis being reached in typhus on the fourteenth day of the fever; while in typhoid, not a crisis but a lysis is reached on the twenty-first day. Typhus may occur at any age, and is commonest amongst the poor. Typhoid is generally a disease of youth or adult life, is rare after forty, and shows no partiality for the poor.

Treatment.—The prophylactic treatment is of essential importance, for if the disease spreads from the dejecta of the fever patient, it is obvious that these should be carefully attended to, and not thrown without due precautions into privies or dunghills, whence they may contaminate the water or milk supply, and give rise to extensive epidemics. Accordingly, Liebermeister recommends the use of a porcelain bed-pan, strewed each time before being used with a layer of sulphate of iron; and immediately after the stool has been passed, crude muriatic acid to be poured over the fæcal mass. If practicable, as in country districts, the contents of the bed-pan should now be

emptied into trenches removed from water-supply sources; and if in the town, where such a proceeding is impossible, thrown into the privy-vaults with a considerable quantity of the acid. Underclothing or bed-clothing soiled with the stools should be immersed in cold water to which a little chloride of zinc has been added, and then thoroughly boiled within twenty-four hours. Dr. Russell of Glasgow states that all washable articles should be disinfected by steam and simple washing, and the experience of Belvidere Fever Hospital shows from statistics of ten years that the process is efficient for destroying the chances of infection. Dr. Russell justly adds "that a sick room cannot be made a scientific laboratory where everything infected can be submitted to chemical or antiseptic manipulation. Steam and plenty of water destroy infection, while they do not render articles acted on useless for the future."

In investigating an epidemic of typhoid fever it is desirable to trace it to its source, and thus it will be essential in many cases, through neglect or ignorance of the prophylactic measures mentioned, to shut up suspected wells, stop the milk supply from an infected dairy, and in each hygienic regulation guard against a panic by giving to the people an intelligent reason for the institution of the measures adopted.

In individual cases a teaspoonful of Vinum Ipecacuanhæ may be given every ten minutes until vomiting ensues, if the patient is seen in the early stage and before the spots have appeared. While purgatives, generally speaking, should be avoided, yet Wunderlich thinks that calomel in a few large doses at the beginning of the attack may bring the fever to a termination. After the disease has been established, it is necessary simply to watch and treat symptoms.

Should the diarrhœa be excessive or weakening, astringents may be given. As a rule, I never give them unless the stools are more than four in the day, and then I give (F. 17, or 22). There is not the same necessity for caution as in typhus with regard to the administration of opium, and the drug may be given either by the mouth

or rectum; if in the former way, combined with catechu (F. 17); in the latter, in the starch and laudanum injection. Should hæmorrhage occur, gallic acid is requisite, with brandy if there be great depression and exhaustion; or the pil. plumb. c. opio, turpentine, or the subcutaneous injection of ergotine may be tried. All drinks should be cooled with ice, ice given to suck, and local applications of cold be made to the abdomen by means of the various indiarubber applications adapted for this purpose. If during the third week the tongue become dry and glazed, and if tympanites exist, then Ol. Terebinth. ℥x. should be given every two hours. In twenty-four to forty-eight hours improvement will be manifested,—the tongue covered with fur, the tympanites diminished. Under these circumstances decrease the dose, but do not stop the turpentine altogether. In extreme prostration, with great tympanites, turpentine, to be effectual, must be given in 60 minim doses. Delirium and sleeplessness may necessitate sedatives, such as chloral, the bromide of potassium, or both combined (F. 69). Peritonitis, whether due to perforation or not, demands absolute rest and full doses of opium, as 1 grain every 3 hours. The opium should be well bruised and given as a powder to avoid any risk of mechanical injury to the ulcers. All physical restraint should be forbidden, as patients are generally easily coaxed by a kind and skilful nurse to do what is requisite. Good ventilation, careful sanitary arrangements, cleanliness, and prevention of bed-sores, should be matters of routine.

"Attention to little things," as Sir William Jenner expresses it, is of paramount importance. Statistics prove that those patients who lay themselves up at its first approach, and do not attempt to fight against the disease, have by far the best chance of recovery. Thus, generally speaking, hospital experience testifies that of patients admitted at the end of the fourth day, 5 per cent die; between the fourth and eleventh, 13 per cent; after the eleventh, 28 per cent. Physical exertion, weariness, prolonged railway travelling, all movements, either on

foot or horseback, or jolting in a carriage during the early and insidious progress of the fever, are to be carefully avoided.

The patient should be confined to bed on the first suspicious symptom, and should not be allowed to leave it until the evening temperature is normal during eighteen days. The possibility of a relapse occurring should never be lost sight of.

Dietetic Treatment.—In the continued fever of typhoid, food too nutritious is injurious immediately and hurtful subsequently by disordering the alimentary canal and increasing the stimulating properties of the blood. Indeed, nature in fever craves for no strong aliment, but longs for something light or liquid, and experience testifies that the diet in continued fever should be milk, given at regular intervals, as half a cupful every two hours. In all, one to two quarts should be taken in twenty-four hours. Peptonising milk injures the taste but little, and it markedly aids digestion. When convalescence is reached the appetite becomes very strong, but the desire should in no circumstances be satisfied by solid food, for the newly-healed ulcers in the small intestines cannot bear any strain. It is only when the morning and evening temperatures reach the normal, and have remained normal for eight or ten days, that milk may be supplemented by animal jellies, weak infusions of flesh, fish, and a very little roast mutton or chicken. Beef-tea, as ordinarily prepared, is little more than warm water flavoured with the meat from which it was made. As an article of diet in fever it should never be relied on, for it has little nutritive power, and has a tendency to aggravate diarrhœa. Tea is acceptable to patients, but it should not be given if it cause flatulence. It may be made nutritious by a large addition of milk. The soup prepared from mutton or chicken is more serviceable when to it is added the yolk or albumen of eggs. Soups also should be varied: thus made from mutton one day and from chicken the next. Fever patients should not only be allowed to sip water as often as the desire prompts them to do so; but

in cases where, from the blunt state of the perception, they manifest no desire for it, it should be systematically given by the nurse. Iced or aerated water in moderation, as too much of the latter may cause flatulence, is not objectionable; and the liquid may be flavoured with lemon or orange juice, if it is thereby rendered more agreeable to the patient.

The student should remember as a summary of dietetic treatment in typhoid fever that milk is the best food; and that no solid food should be taken until the tongue is clean, all pain on pressure over the iliac region gone, and the temperature has remained normal for eight or ten days.

The nurse should see to the bed-pan being used, and on no account should the patient be allowed to go to stool, however slight the fever may be. All unnecessary exposure when the temperature is taken should be avoided; all business affairs, all communications likely to annoy, kept away from the sick-bed. Questions should be briefly and kindly answered, but conversation studiously interdicted. The temperature of the room should be kept about 64° F., not higher. Draughts must be prevented; and in private houses, if practicable, a window should always be kept open in the next room, and the door between the two rooms never closed.

Latterly, under the impression that the true danger in this, as in other fevers, consists "in the deleterious influence of a high temperature" on the tissues, it has been attempted to lower the abnormal temperature. This "antipyretic" treatment may be carried out in one of the following ways if the temperature should be over 102·2° F. in the axilla:—1*st*, A full-length cold bath of 68° F. of ten minutes' duration, and repeated, so that in severe cases twelve baths are given every twenty-four hours; or 2*nd*, Give from twenty-two to forty-five grains of quinine within the space of half an hour or an hour, and do not repeat it, as a rule, until two days have elapsed. 3*rd*, In exceptional cases digitalis may be combined with the quinine, so that eleven grains of the

powder of digitalis may be cautiously given at intervals during thirty-six hours, and followed by the large dose of quinine previously mentioned. This line of treatment in typhoid fever, according to the statistics of Liebermeister, seems to have been highly successful; but it is to be remembered that in English practice it has not yet been sufficiently tried to be absolutely recommended. *4th*, Antipyrin has recently attracted attention as an antipyretic. It is a synthetically prepared alkaloid, and is seen as a white powder, readily soluble in water. It may be given to an adult in doses of thirty grains hourly for three hours. The dose for a child is mentioned afterwards under scarlet fever, p. 72. This substance thus given reduces the temperature for several hours, and when its effects pass away the rise of temperature is not marked by rigor. It causes profuse perspiration, has no action on the respiration, and is excreted by the urine. 3½ grs. of antifebrin is said to have the same effect as 15 grs. of antipyrin. Finally, a careful thermometric chart of the temperature, as taken morning and evening, is the only satisfactory index of the fever.

RELAPSING FEVER,

known also as recurrent typhus or famine fever, was long confounded with typhus, as epidemics of relapsing fever have usually coexisted with epidemics of typhus. Accurate historical records clearly show how careful observers saw its non-identity with ordinary typhus as far back as 1817, and how this opinion was confirmed by the remarkable epidemic of 1842-43, which was chiefly confined to Scotland. These opinions gained greater strength when it reappeared in 1846, and lingered with varying intensity in different parts of the United Kingdom until 1853, when it entirely disappeared from this country for fourteen years. In 1868 it was again observed in London, and also attacked other large towns. Since 1871 no cases of relapsing fever seem to have been noted. The observa-

tions made as to the nature of this fever clearly prove that it is highly contagious; that it may originate from filth, overcrowding, and destitution—notably the latter; that it is allied to times of scarcity, and thus has its home chiefly in the dwellings of the very poor. It is associated with a *spirillum*, which is supposed to enter the system either directly or through the taking of fluids or solids. The spirillum was first noticed by Obermeyer in the blood of a patient suffering from relapsing fever. It has since been seen by many observers, but most authorities are agreed that it is to be found only during the paroxysms of the disease, and that as the temperature falls the micro-organisms disappear. When a specimen of blood containing them is placed under the microscope they appear as long and very delicate unsegmented threads twisted into spirals. Their average length is about six or seven times the diameter of a red blood-corpuscle. They have a brisk vibratile movement in the direction of their long axis, and are extremely sensitive to reagents of all kinds, even the addition of distilled water causing them to disappear. The period of incubation of this fever is from five to seven days. It is most common in early childhood, and from the twentieth to the thirtieth year. Between thirty and fifty it is rare; and after fifty it is scarcely ever seen.

Symptoms.—Unlike the other fevers mentioned, there are no forewarners. The disease sets in suddenly with headache and intense fever, which at once prostrate the patient, and it is accompanied with thirst, loss of appetite, pain in limbs, and burning heat of skin. The temperature for the first two days is usually 102° F. morning, and 104° F. evening, and then it mounts to 105° F. and 107° F. The pulse is weak and quick, and the skin moist. The tongue is thickly coated, not parched and black, as in typhus. The bowels are constipated.

On the second day the liver and spleen, especially the latter, notably enlarge—not merely from day to day, but from morning to evening. There is little delirium. The high fever, the rapid loss of strength, the splenic enlargement, indicate a fever likely soon to be fatal; when, as

suddenly as it came, on the fifth, sixth, or more usually on the seventh day, there is a crisis, with profuse sweating, rapid fall of temperature, and complete improvement of all the symptoms, with entire decrease of the splenic enlargement. The only thing left is great languor, which sometimes may approach syncope.

This interval of freedom lasts usually a week, when a relapse occurs, generally at night, with all the symptoms which characterised the previous attack. This attack is, however, shorter, lasting only three or five days. It suddenly ceases, leaving the patient weak and anæmic, and entailing a lingering recovery of from four or five to six weeks. As many as four or five relapses have been known.

Prognosis and Complications.—In only two or three per cent of the cases is the fever fatal. Death may occur from the intensity of the fever, or from complications, as pneumonia or abscess of the spleen.

Post-Mortem Appearances.—If death occur from the disease, the spleen may be found greatly enlarged, the capsule tense, the parenchyma soft and pulpy, with wedge-shaped infarctions due to emboli. The liver and kidneys are also congested. Nothing of special note is observed in the other organs.

Treatment.—Rest in bed, cleanliness, milk, strong soup, and wine are necessary. A bladder of ice may be applied to the head, to relieve headache; and water charged with carbonic acid given to allay thirst. For splenic pain apply cold applications or continuous poultices.

Ten drops of dilute phosphoric acid should be given in sweetened water every two hours; if symptoms of collapse, ammonii carbonas and alcohol; if delirium, 15-grain doses of chloral every hour, until one or two drachms have been taken, unless sleep has been previously produced.

During convalescence, good nourishing diet, with wine, and the preparations of quinine and iron, are essential.

INTERMITTENT FEVERS (AGUE)

These fevers constitute a class by themselves, and were well known to the ancients.

They are dependent on certain marshy miasms, and are endemic, not epidemic, in character.

The febrile phenomena occur in PAROXYSMS, ushered in by rigors, and terminate by a critical sweat.

There are three distinct stages—1, a stage of chill; 2, of heat; 3, of sweat.

The fevers are divided into types according to the length of these stages, for the attacks occur pretty regularly—every twenty-four hours (quotidian); every forty-eight hours (tertian); every seventy-two hours (quartan).

The time between the commencement of one paroxysm and the beginning of the next is termed the INTERVAL; that between the termination of one paroxysm and the commencement of the next the INTERMISSION.

The type most common in temperate climates is the tertian.

Etiology.—While the predisposing causes are those which weaken the system, as exhaustion, insufficient food, intemperance, or exposure to night air, the exciting causes are certain peculiar invisible emanations, undetected by chemistry or the microscope, which are known as malaria, and spring chiefly from marshy lands. Most probably decomposing animal and vegetable matters, chiefly, if not entirely, the latter, furnish the *materies morbi*, for it is an established fact that ague in time past was common in certain tracts of country then uncultivated, whereas now, since the land has been drained and purified by agriculture, the disease is unknown.

Symptoms.—The invasion may take place suddenly or after a few days of indisposition, with headache, loss of appetite, and sneezing.

The *cold* stage is characterised by chilliness first in the limbs, and afterwards over the whole body, with a sensation of streams of cold water running down the back;

shrivelled skin, "cutis anserina," chattering of the teeth, blueness of the nails, hurried respiration, and small pulse.

The duration of this stage varies from half an hour to three or four hours, and is succeeded by the *hot* stage or reaction, with increased temperature, dry skin, great thirst, frequent pulse, and a peculiar fulness about the head.

This hot stage usually lasts from three to four hours, but it may be prolonged to six, eight, or twelve hours, and is then followed by the *sweating* stage, beginning with a diminution of the heat, followed by a gentle moisture on the forehead and breast, and terminating in a copious, sour-smelling, steaming sweat, with an abundant flow of urine, normal pulse, and a cessation of all pain or uneasiness. The urine during the three stages mentioned varies; thus in the cold stage it is usually increased in quantity, clear and watery, of low specific gravity, and without sediment. In the hot stage it is voided but sparingly; it is also red and of high specific gravity. In the sweating stage it is passed freely; it is of high specific gravity, rich in solid ingredients, and throws down a brick-dust sediment of the urates. This stage in its duration cannot be easily determined, but it appears materially to exceed the other two.

The fever thus described rarely results directly in death, but it often induces permanent enlargement of the spleen, with induration, popularly known as the Ague Cake. The enlargement is a pure hypertrophy—that is, an enlargement of every element of the organ—and is accompanied by a peculiar cachexia.

There are also congestion and pigmentation in the liver, with serious disturbance of all the digestive organs. The patient is subject to cachexia from enlargement of the spleen, and even after his recovery from that he is much more subject to recurrences of the fever, which do not necessarily require new exposure; and the periodic character may imprint itself upon other diseases to which he is predisposed, as rheumatism or neuralgia. He seems to carry the seeds about with him.

Treatment.—In the cold stage the patient should be placed in bed covered with blankets and rugs, with hot bottles applied to his feet, and hot drinks, such as tea or weak negus, should be given.

In the hot stage cooling drinks are required, and the body should be sponged with tepid or cold water.

In the sweating stage great care must be taken to prevent chills, and the action of the skin should be encouraged by tepid drinks.

Quinine being the great remedy in this fever, it may be asked, When should it be given? at what period of the fever? and in what doses? and how long should it be continued? The answer to these inquiries may thus be summarised: It should be given DURING the INTERMISSIONS in a large dose, 20 to 30 grains, and at the CLOSE of the PAROXYSM, and repeated in 15-grain doses, with an interval first of one, then of two, three, and four days. Further paroxysms being thus averted, it should be taken for some months, not as an antipyretic, but in ordinary therapeutic doses. The reason why quinine is not given immediately preceding the paroxysm is that the stomach is apt to reject it, and it only aggravates what it fails to avert. Probably the hypodermic injection might hasten its action and cut short the paroxysm, even though begun. The sulphate of quinine can be dissolved in tartaric acid in the proportion of 36 grains of quinine, 15 of tartaric acid, and half an ounce of water. So prepared it causes no pain on injection, and gives rise to no abscesses or other inconvenience. Each injection of 20 drops contains three grains of quinine. Ten minutes after injecting, the quinine can be detected in the urine, by the tests of the iodide of potassium, or the iodide of potassium and corrosive sublimate (F. 94). In the irregular manifestations of ague evidenced by headache and neuralgia arsenic is sometimes more serviceable than quinine.

REMITTENT FEVER

appears to be dependent on the same causes as intermittent fever, viz. malaria. It is also endemic, non-contagious, and is chiefly confined to tropical climates. The different localities in which it prevails have led to its being designated by various names. It is thus called Walcheren fever, Bengal fever, BILIOUS REMITTENT of the West Indies, JUNGLE or HILL FEVER of the East Indies, African fever, Mediterranean fever, etc.

The symptoms resemble those of intermittent fever; it is distinguished from it, however, by the notable fact THAT IN ITS COURSE THERE IS NO ENTIRE CESSATION OF THE FEVER, BUT SIMPLY AN ABATEMENT OR DIMINUTION. The disease continues from twelve to fourteen days, and the period of remission varies from six to twelve or fourteen hours. It is worthy of note that a distinct sliding scale of periodicity can be traced from intermittent fever down through remittent to the severe tropical continued fevers.

Symptoms.—The fever is ushered in with gastric symptoms, uneasiness, depression, and sinking at the epigastrium, with headache and languor. The cold stage is scarcely marked, or if so, is rapidly succeeded by a severe hot stage, with burning skin, vomiting, sleeplessness, intense headache, or even delirium. This stage, usually lasting the time mentioned, is succeeded by an indistinct stage of sweating or subsidence, and is followed by another attack similar to the first, but more severe. These attacks and varying remissions constitute the fever, which terminates in recovery or death, often in permanent ill-health. Occasionally there is jaundice, and the liver and spleen are enlarged and tender. The remissions usually set in during the morning, while the exacerbations take place towards the evening.

Treatment.—The object of treatment is to mitigate the exacerbations, and lengthen the remissions, and is based on the same principles as those indicated in intermittent

fever. Thus, see that the bowels are acted on, sponge the body, or use the cold pack, and give effervescing and saline drinks. When the remission occurs, give quinine in doses varying from four to six grains every three hours, omitting the remedy when the hot stage commences, but resuming it at the next remission. Cold should be applied to the head if the headache is severe, and sinapisms to the stomach to relieve the gastric irritation. If there be much exhaustion, stimulants should be freely given.

At the termination of the disease the patient should, if possible, be sent to a temperate climate, or a non-malarious district.

In very chronic cases fresh air and outdoor exercise seem to be beneficial, with the administration of iron. Dr. M'Lean highly recommends the use of the biniodide of mercury ointment in the treatment of chronic enlargements of the spleen or liver.

YELLOW FEVER

requires an average temperature of at least 72° F. for some weeks to produce its appearance, and seems peculiarly to affect the West Indies, Africa, and some parts of America.

It varies in severity, frequently terminating in death either by the acuteness of the fever, or by exhaustion or intercurrent complications, such as uræmia or apoplexy. It is sometimes epidemic, and it is a matter of dispute whether or not it is contagious. It appears to be dependent on some morbid poison, probably of malarial origin.

Symptoms.—The fever commences abruptly, often in the middle of the night, and is attended with severe headache, great irritability of the stomach, with vomiting, and a peculiar yellowness of the skin; the vomited matters at first being slimy and tasteless, and afterwards black, like coffee grounds—hence called *black vomit.* The urine is frequently suppressed; if passed it is

loaded with albumen and tube-casts, and is smoky in appearance. The fever usually lasts from three to five or seven days.

When six days elapse without the occurrence of black vomit or suppression of urine, hopes of recovery may be entertained. The mortality is usually one in three.

The symptoms of the fever point to the poison specially affecting the liver, which is supposed to undergo acute fatty degeneration. The poison is considered to produce certain specific changes in the blood—viz. destruction of the red corpuscles. The blood thus loses its capacity for nourishing and regenerating the tissues, and when death does not take place there is a lingering convalescence, consequent on the feebleness of the whole organism.

Treatment.—Although yellow fever is dependent on malaria like the preceding fever, it is to be remembered that the spleen does not seem to be affected, and hence, probably, quinine is of little service. We have no specific for the disease, and the treatment is thus symptomatic. It is of the utmost importance that the person attacked should not attempt to fight against the fever, but go at once to his bed, and take a dose of castor oil. He should encourage perspiration by warm drinks and by plenty of blankets. If these means accomplish their ends, then symptoms must be met as they arise. Nausea and vomiting by ice and by morphine injected subcutaneously in the epigastric region. The diet should consist of iced milk or barley water, and stimulants as iced champagne or iced soda and brandy should be given freely. No solid food should be allowed for at least ten days, and even then it should be taken with great caution and in a moderate quantity.

The treatment mentioned is generally adopted, but late investigations seem to show that this fever depends upon a micro-organism which can be detected in the blood drawn from the person attacked. The development of this micro-organism is checked by perchloride of mercury, and hence it has been recommended to give it internally to arrest the proliferation of germs. ℞ Sodii

Bicarb. grammes x., Hydrarg. Perchlor. centigrammes ii., Aq. Pur. litri i., M.—Sig. 1 gramme every hour, given ice-cold.

Dietetics.—As soon as the stomach is able to retain food and drink, a light nutritious diet is essential, with wine. Citrate of iron and quinine to aid convalescence.

DENGUE OR DENGÉ

is a peculiar exanthematous disease which has prevailed epidemically in Eastern Africa, British India, the West Indian Islands, and the Southern States of America. The epidemics invariably appear after long intervals, and they seem to originate independently of any antecedent case. After an interval of about fifty years, the last epidemic of Dengé originated in Zanzibar in 1870, and continued to spread in India till 1875.

Symptoms.—After a short, but indefinite, stage of incubation, the patient is suddenly attacked with pain and stiffness of the muscles, especially in the palms of the hands and soles of the feet, rendering every movement very painful. This is speedily followed by pain over the whole body, more particularly in the back, shoulders, and ankle-joints. After twenty-four hours there is swelling of the small articulations and severe pain on pressure. The febrile stage sets in immediately after the accession of pain, and is accompanied by a scarlet efflorescence extending between the cheek-bones, across the bridge of the nose. The average duration of the febrile stage is about forty-eight hours, and this is followed by a period of remission of from two to three days. On the fourth day, the febrile symptoms reappear; and, on the fifth day, the peculiar exanthematous eruption comes out, spreads over the entire body within forty-eight hours, extending from the head and face to the lower extremities. When the eruption has become general, the lymphatic glands begin to swell, the occipital invariably; the mucous membrane of the mouth and nose is implicated, and sometimes the throat. On the fifth and sixth days, the symptoms reach their maximum of intensity; and on the seventh or eighth day, desquamation of the cuticle begins, and terminates as in scarlatina. Dengé is very rarely fatal.

Treatment.—It is almost always necessary to administer an active cathartic, as obstinate constipation is the rule. Quinine, in five-grain doses, should be given, after the bowels have acted freely. When the febrile symptoms disappear, iodide of potassium, in four or five grain doses, should be given and continued during the period of remission and for several days after desquamation has been completed.

TABULAR STATEMENT OF CHIEF POINTS IN FEVERS

	Incubation.	Eruption appears on	Eruption fades on
TYPHUS	usually 1 to 14 days	5th day of fever on back and sides	14th day of fever.
TYPHOID	,, 14 to 21 days	7th or 8th day of fever, or even later, on abdomen, in successive crops	the last crop on the 21st to 30th day of fever.
SCARLET FEVER . . .	,, 2 to 6 days	2d day of fever on trunk	5th day of fever.
SMALL-POX	,, 12 to 14 days	3d day of fever on face and forehead	scabs form on 9th or 10th day of fever, and fall off about the 14th.
MEASLES	,, 10 to 14 days	4th day of fever on forehead	7th day of fever.
GERMAN MEASLES (Rötheln)	,, 7 to 14 days	1st to 4th day of fever on face	4th to 6th day of fever or sooner.
CHICKEN-POX . . .	,, 10 to 14 days	1st day of fever on shoulders, in successive crops	on 4th day of fever the vesicles form scabs.

THE PLAGUE,

called by Heberden "The black death," was formerly prevalent throughout Europe, and terribly fatal. Now it is little known except in certain parts of the East, Egypt, and Asia Minor. It is caused by a morbid poison, which spreads by contagion, and is epidemic in its nature.

Post-mortem appearances reveal great congestion of internal organs, especially the spleen, with effusion into serous cavities.

It is characterised during life by fever of a low type, with high delirium tending to a typhoid form, by enlargement of lymphatic glands and formation of buboes, with carbuncles and ecchymoses, vomiting of black matter, and hæmorrhage from the mouth, stomach, and bowels. There is often, also, a cutaneous rash like that of typhus.

It terminates most frequently in death.

ERUPTIVE FEVERS

Small-pox, measles, and scarlet fever, are simply continued fevers, with a characteristic eruption superadded. In these fevers a definite period of time elapses from the reception of the fever until the appearance of the eruption and its final disappearance. Thus, measles has an incubation of from twelve to fourteen days, the eruption appearing on the third or fourth day of the fever, and fading on the seventh.

Scarlet fever has an incubation of from two to six days, the eruption appearing earlier than in measles, viz. on the second day of the fever, and disappearing on the fifth. Small-pox has an incubation of from twelve to fourteen days, the eruption appearing on the third day of the fever. The eruption does not fade away so rapidly as in the other two: scabs form on the tenth day of the fever, and commence to fall off about the fourteenth.

These fevers are distinguished from one another not merely by the facts mentioned, but by other peculiarities.

SMALL-POX

The first authentic narrative of small-pox as a distinct disease is given by an Arabian physician, Rhazes, in the year 900, and

it was recognised in after years as the most dreaded scourge of the human race, as the hereditary curse of mankind, as an inheritance which neither time nor medicine could dissipate. To rob it of some of its terrors, to modify its most alarming features, Lady Mary Wortley Montague, in 1718, introduced the practice of inoculation. The essential character of this proceeding was the insertion of small-pox matter in a healthy person, and it was found that small-pox so imparted gave rise to a milder form of the disease, and less chance of succumbing to the virulence of the poison than when caught in the ordinary way. The benefits conferred by its adoption were great to the inoculated ; but small-pox perpetuates small-pox, and in proportion as inoculation was actively undertaken, centres of contagion were multiplied, and almost every home was converted into a hospital. Inoculation did not diminish, nay it actually increased, the mortality from small-pox.

The vitality of the disease was thus not conquered when Edward Jenner, on 14th May 1796, announced the birthday of vaccination. On that day matter was taken from the hand of Sarah Nelmes, who had been infected by her master's cows, and it was inserted into the arm of James Phipps. Satisfactory vaccine vesicles ensued. Subsequent experimenting by small-pox inoculation on the same boy yielded a negative result, and Jenner believed that vaccination, actively and efficiently performed, would in the course of time obliterate small-pox, and cause it only to be remembered like extinct epidemics of the Middle Ages. This estimate—naturally a sanguine one of Jenner's—has not been confirmed, for small-pox still exists, it may be owing to gross carelessness or wilful neglect, or inefficient performance of vaccination ; and when it occurs on an unvaccinated person, it has lost none of those features which rendered it so repulsive and fatal in bygone times. It is still the loathsome malady dreaded by all who have seen it, and even avoided by those who know it only by repute. Occurring, however, on a person who has been previously vaccinated, it is a mild non-fatal disease, and loses also its hideous characteristics. Briefly stated, it may be said then to present an eruption limited to a few scattered uncoalescing pustules, which reach their acme on the fourth day, and then heal and die away. There is no delirium and no pitting in the vast majority of cases, and the mortality is only 1 per cent. Except in the premonitory fever, which is of the same intensity in both, the two diseases are essentially distinct.

After these remarks, it may now be observed that in small-pox a specific poison is taken into the system, and after twelve days' incubation fever is ushered in with

shivering, weariness, and PAIN IN THE SMALL OF THE BACK, AND VERY FREQUENTLY VOMITING. These two latter symptoms are very characteristic of small-pox, and may guide in distinguishing it, before the eruption appears, from the two other fevers mentioned. Sometimes very acute delirium may appear in the first twenty-four hours, not remaining over three days. In children convulsions are substituted for the delirium. Lachrymation and salivation are often early symptoms. A papular eruption appears on the third day on the forehead, neck, mouth, hands, then on the trunk, and lastly on the lower extremities. If the papules remain separate and distinct, we have what is termed Simple Small-pox, or Variola Discreta. If they are numerous, they coalesce, and we have Confluent Small-pox, or Variola Confluens.

In *Variola Discreta* we observe on the third day of the eruption a vesicle forming on the papule, and around this an inflamed area. Two days after this the transparent lymph, which the vesicle at first contains, is changed into pus. After this the top becomes gradually depressed until it divides the pustule into two. This condition is termed *umbilication*, and is very characteristic of the small-pox eruption. A peculiar greasy odour, difficult to describe, but never forgotten if once detected, is now apparent in the room.

About the ninth or tenth day the pustule breaks and a scab forms. These scabs fall off about the fourteenth day of the fever, and a red stain is left on the skin, which gradually disappears. Should, however, the true skin be attacked, a permanent mark remains, and the patient becomes pock-marked.

In *Variola Confluens* the simple state of matters we have described is generally altered for the worse. The headache, the pain in the back, and the vomiting are more severe, and a more copious eruption appears. Developing as the simple type did, the vesicles become so continuous as to render it sometimes impossible to put a pin's head between them. This is specially observed in the face, which becomes so swollen as to render the

features unrecognisable. Large black scabs form, and the characteristic odour is sickening in the extreme. The mucous membranes of the mouth, larynx, and trachea are implicated. The voice is husky, throat sore, and swallowing is difficult. Cough and dyspnœa are also distressing, and there is delirium.

There is thus a very marked distinction between the general appearance and symptoms of the simple and the confluent type of small-pox, and there is also a great difference in what is termed "The Secondary Fever." This term is somewhat puzzling, and hence it is necessary to explain that the high fever which precedes the small-pox eruption in either form abates when the eruption appears. This is designated "The Primary Fever." It is to be noted that in Epidemic Small-pox patients may catch the infection, and die during the Primary Fever stage, and before the development of the vesicular eruption. It would appear that the intensity of the poison thus early destroys life, but yet during life it may be apprehended if, with great prostration and high fever, there is an intense bright brick-red stippling of the skin, most abundant on the lower part of the abdomen, and on the thighs, accompanied often with scattered "fleabite" petechiæ, with conjunctival ecchymoses, with "black-eye" ecchymosis, livid markings of the face, with hæmorrhage from mucous surfaces. The stippling becomes more diffused, deepens in hue to violet, and if the patient lives long enough, becomes the seat of a vesicular eruption. This form of small-pox is termed Hæmorrhagic, Black, or Malignant, and is not unfrequently mistaken for purpura, and its non-detection and failure to separate the patient from the rest of the household may lead to serious consequences. It is said that the "stippling" described is very striking and characteristic.

Fever again appears as the pustules mature on the seventh day of the eruption, or ninth of the fever, and then it is termed "The Secondary Fever," which is of a typhoid or inflammatory type. As might be expected from the description of the two forms of small-pox given,

it is slight in the first variety (variola simplex), while it is violent in the second (variola confluens), and very often proves immediately fatal. It may be accompanied by boils, erysipelas, or ulceration of the cornea or membrana tympani.

Prognosis.—In persons who have been previously vaccinated efficiently, or in whom the attack is non-confluent, the disease is rarely fatal. In those who have not been vaccinated the mortality is one in three. Further, if the papules be filled with blood (hæmorrhagic form of eruption) or serum, not umbilicated, and if extending, the prognosis is extremely unfavourable. Lastly, the "corymbose" form of eruption (where it groups itself into patches) is of very bad omen.

Treatment.—There is no contagion so sure as small-pox, none which acts at a greater distance, and hence prophylactic measures are of paramount importance. The sick person should be isolated, and those in attendance, before seeing other people, should wash thoroughly and change their clothes. If the disease has entered a household of the poor, removal to a special hospital is essential. Every one likely to be exposed to the contagion should be re-vaccinated, and patients who have recovered should be kept in the strictest quarantine until all crusts have fallen off. Clothes worn or bedding used should be destroyed, and the apartment thoroughly fumigated before again being occupied. Neither vaccination nor medicine is of any avail when small-pox is incubating or has appeared. The disease must run its course, and all that can be done is to enable it to do so under the most favourable circumstances. The patient should be kept in a cool, well-ventilated room. The diet ought to be light, and saline draughts or lemon-juice may be administered to diminish the thirst and regulate the bowels. The only internal medicine which seems to have any efficacy in the pustular stages of small-pox is salicylic acid (F. 66).

In the secondary fever, if it be severe, quinine (F. 75) and stimulants should be given, with good broth or strong beef-tea. If there is great restlessness, opium or bromide

of potassium and chloralamide (F. 69*a*) are useful. If the sores are sloughy, and the system is greatly depressed, wine or brandy must be administered to sustain the strength through the attack. If the mouth and pharynx are much involved, a weak solution of iron may be employed as a gargle, and mucilaginous drinks, to which some chlorate of potassium may be added.

Locally no escharotic treatment seems of any avail. The pustules should be smeared with cold cream, or carron oil, or carbolic acid lotion (F. 56*a*, 57), or with oxide of zinc and hydrocyanic acid, to relieve the itching (F. 61). Iced compresses, moreover, applied wherever the eruption is abundant, are said to diminish the pain and swelling better than anything else.

When the pustules have burst, some dry powder of starch or oxide of zinc should be applied.

All scratching should be prevented, and to effect this the hands of young patients should be tied.

Warm, slightly alkaline, baths may be given during the stage of decrustation every day, and the body afterwards anointed with oil or any kind of fat.

VACCINIA OR COW-POX

The remarkable discovery of Jenner towards the end of the last century marks an era in medicine. All experience testifies that, while vaccination does not infallibly prevent small-pox, it yet so far modifies the disease as to rob it of its disgusting phenomena and sequelæ, and to render it a comparatively trifling malady. It is unnecessary to detail the process of vaccination further than to state that after the simple operation has been performed a little redness and elevation can be detected on the SECOND day. A vesicle with depressed centre and raised edges is seen on the fifth, and reaches its acme on the EIGHTH day. It is now observed to be composed of a number of cells containing clear lymph and situated on a hard base. On the NINTH or TENTH day these burst,

and a scab is formed, which finally falls off on the TWENTY-FIRST day, leaving a well-marked permanent cicatrix.

A little constitutional disturbance attends the process.

VARICELLA OR CHICKEN-POX

is a trifling affection, attacking infants or young children, attended with only slight fever, if with any. The eruption consists at first of pimples, which on the second day are converted into vesicles. These burst on the fourth day, and rapidly dry up. The rash first appears on the SHOULDERS or TRUNK; subsequently it may attack the scalp, but it rarely involves the face. Chicken-pox has been occasionally mistaken for a mild case of small-pox, and mistakes in diagnosis are apt to occur when there is a small-pox epidemic.

It is therefore to be carefully remembered that the points which should guide us in distinguishing the two are the MILDNESS OF THE PREMONITORY SYMPTOMS; THE FIRST APPEARANCE OF THE ERUPTION ON THE TRUNK INSTEAD OF THE FOREHEAD; THE PAPULES RAPIDLY BECOMING VESICULAR; THE ABSENCE OF HARDNESS ROUND THE VESICLES; AND THE SHORTER COURSE OF THE DISEASE. It seems to have an incubation of fourteen days, and is undoubtedly contagious.

SCARLET FEVER

is eminently contagious. It is usually a disease of childhood, occurring once in a lifetime, and derives its name from the character of the eruption, which is red, minutely punctated, appearing on the second day of the fever or earlier, and lasting three days. It commences on the NECK and upper part of the trunk and thence proceeds to the face, lower part of trunk and extremities. In addition to the fever and the eruption, the disease evidences itself on the tonsils and mucous membrane of the mouth and pharynx.

It varies in severity, and hence has been divided into

Scarlatina Simplex,
,, Anginosa,
,, Maligna.

In *Scarlatina Simplex* the fever runs a simple and natural course, the eruption appearing after the usual incubatory stage, disappearing on pressure, fading on the fifth day, and terminating generally with desquamation of the cuticle on the face and trunk. This desquamation takes the form of scurf on the body, while on the hands and feet large patches of skin may come away at once. The process of desquamation may continue for days or weeks, accompanied by itching. The tongue in scarlet fever is very characteristic. At first it may be covered with a white fur; as this clears away it becomes red, the lengthened filiform papillæ project, and the organ presents a STRAWBERRY appearance. The tonsils and mucous membrane of the mouth are congested, but in a mild degree.

In *Scarlatina Anginosa* the fever is of a much more violent character, being often attended with delirium, great restlessness, and prostration. The temperature, as in Scarlatina Simplex, rises rapidly, but maintains a higher level—indeed often becoming hyperpyretic. Cases of 108° to 109° F. have been recorded. The eruption may be delayed to the third or fourth day, is of a more livid colour, and it may be even patchy and evanescent. The throat symptoms are more severe, the tonsils being greatly swollen, and ulcers frequently forming on them. The neck is stiff, the sub-maxillary glands enlarged, and deglutition is difficult. Even after the eruption has disappeared, the throat symptoms do not abate in severity, as in the simple form.

Scarlatina Maligna is attended with marked cerebral disturbance, passing into coma, and with great vital prostration. There is severe vomiting and retching. Tenacious phlegm hangs about the mouth and throat, the teeth are covered with sordes, the tonsil ulceration may become gangrenous, and the breath is very offensive.

The rash is irregular in its appearance and its continuance, and is of a livid colour. This variety, as its name implies, is usually fatal. The vital powers succumb to the strength of the poison on the fourth or fifth day, or even sooner. Hope may, however, be entertained if the seventh or eighth day is passed.

The dangers arising from scarlet fever, considered as a whole, do not terminate with the subsidence of the fever. Troublesome and even fatal sequelæ may result. The cervical glands may remain permanently enlarged—abscesses may form—ophthalmia result—or a muco-purulent discharge obstruct the nares, or the throat affection may spread from the pharynx up the Eustachian tube, causing disease of the ear and deafness. In a certain proportion of cases Rheumatism occurs, usually from the fifth to the seventh day, and is sometimes complicated by heart disease. One of the most common and not the least dangerous sequela, however, is the affection of the kidneys, resulting in anasarca and albuminous urine. It is to be carefully observed that this result is common even in those cases where the primary fever was of a mild form. The patient has probably suffered little or no disturbance from the fever, and is perhaps exposed to cold or draughts during the stage of desquamation. The excretory powers of the skin are impeded, and increased work is thrown on the kidneys, bringing on acute desquamative nephritis (acute Bright's disease). This may be ushered in with shivering, fever, and pains in the back, or it may come on insidiously. The face becomes puffy, and this is followed by general swelling, with scanty, high-coloured, and albuminous urine. Under the microscope the urine presents blood corpuscles, coagulated fibrin, and epithelial casts.

Anatomical Changes.—There are no distinctive post-mortem appearances in scarlet fever. The ordinary anatomical changes may be summed up in a single sentence —Superficial œdema of the skin, with inflammation of the fauces, and congestion and catarrh of the tubules of the kidneys.

Prognosis.—The throat is the source of greatest danger.

"Whenever," says Sir Thomas Watson, "I see the glands much enlarged at the angle of the jaw, and beneath the jaw, in a child suffering from scarlet fever, I augur ill of the disease." If, in addition, the urine is very scanty and albuminous, the danger is increased by a tendency to uræmia. When these symptoms are absent the prognosis is more favourable. In the majority of cases the dropsy disappears, though a serious permanent injury to the kidney may be the result.

Treatment.—Attention to the bowels, with a slight febrifuge mixture, and rest in bed, are alone necessary in simple scarlet fever. For a drink in this, as in the more severe forms, potass. chlorate, 60 grains, in a pint of water, may be given freely. The parents should be warned to keep the patient in bed in a warm room, until the desquamation is over, and after that flannel should be worn.

In Scarlatina Anginosa, in addition to the above, if the fever is considerable, tepid sponging, or wet-sheet packing, may be employed. Shaving of the head, and the application of vinegar cloths afterwards, should be insisted on. If the throat is much inflamed, and the patient is an adult, five or six leeches should be applied. If a child, hot poultices should be applied instead of leeches. Tincture of aconite in minim doses every quarter of an hour, or half-hour, until the fever is lowered, then every hour or two hours as may be deemed necessary, to keep up the antipyretic action. If the throat is much affected, potass. chloras., tinct. ferri perchlor. and glycerine (F. 91*b*), and ammonii carbonas 2 to 3 grains in milk every two or three hours, when prostration is great. When the fever is high, and patient delirious, sulph. quininæ gr. iii. thrice daily in milk, to a child of five years; or antipyrin, one grain and a half for each year of the child's life, at an interval of three hours. Beef-tea and wine are necessary if the patient is weak and prostrated.

The great prostration in Scarlatina Maligna necessitates from the first a stimulating treatment dietetic and medicinal. Wine or brandy should be given freely. Three ounces of port wine may be given to a child, and double

or treble that quantity to an adult, in the twelve hours. Carbonate of ammonia is the best medicinal agent.

The ulceration of the throat ought to be touched with nitrate of silver, or with a mixture of tannin and glycerine, if the child does not offer marked resistance.

To facilitate desquamation the body should be rubbed with oil, and warm clothing worn to avoid the risk of catching cold. When these precautions are observed the recovery from scarlet fever may be completed without any sequelæ, but if they are neglected desquamation is arrested and symptoms of acute inflammation of the kidney may set in rapidly, and to subdue this with success treatment should be prompt and decided. Leeches should be applied to the lumbar region; or this part should be cupped, and the further abstraction of blood solicited by linseed meal poultices. Tincture of aconite in $\frac{1}{2}$ or 1m. doses should be given in water every ten minutes for two hours, and after the expiry of that time hourly for twenty-four hours. An active hydragogue cathartic, as pulv. jalapæ co., assists the preceding efforts to relieve the strain on the kidneys. The inflammation may thus be cut short, and albumen after a short interval disappear from the urine. To aid convalescence a scaly preparation of iron should be ordered or the tinctura ferri acetatis, which in such circumstances seems preferable to the tinctura ferri perchloridi. In convalescence from any attack of scarlet fever the urine should be daily tested. This is a duty which should never be forgotten, for in some cases the approach of the kidney disease is marked by no acute local or general symptoms, the first visible sign being anasarca. If uræmic convulsions occur, blood-letting, general or local, must be resorted to, together with other means suggested under "Uræmia."

MEASLES

was long confounded with scarlet fever, and it is only since the beginning of the last century that it has been recognised as a specific and independent disease.

Measles is contagious, but the cause of the contagion is unknown. Susceptibility to the contagion diminishes with years, and SECOND ATTACKS ARE RARE. The incubatory stage of measles, judging from the epidemic in the Fiji Islands, and other isolated instances, lasts from ten to fourteen days.

Symptoms.—Measles may be considered a catarrhal fever, with a characteristic eruption added to it, the eruption appearing first on the face and forehead, and afterwards on the trunk and extremities. The symptoms of catarrh—running at the eyes and nose, cough and sneezing, with great oppression and foul tongue—precede the eruption. The fever which accompanies these catarrhal symptoms indicates that an exanthem will follow. This fever, with a temperature it may be of 102° F., lasts for three or four days, when an eruption of small circular dots, at first isolated, appears on the forehead, spreading to the trunk, limbs, and feet. These do not remain distinct, but coalesce, until patches of a reddish colour and of irregular shapes cover the parts affected, accompanied by flushing of the face. Thirty-six hours from the commencement of the eruption the temperature is highest, usually about 104° F., or over it. The eruption lasts THREE days, and fades in the order of its appearance, clearing off the face first; it leaves reddish-brown stains, which may persist for one or two weeks, and a slight branny desquamation, especially from the skin of the face. With the disappearance of the rash, the temperature rapidly falls to the normal, and the other symptoms gradually subside. The above constitutes what may be considered the normal type and course of measles. Yet it should be remembered that there are many departures from this type. Thus we have—the essentially mild and the severe.

Of the first variety there seem to be two forms—measles without catarrh, and measles without eruption.

The former attacks chiefly young persons, gives rise to little sickness, yet effectually destroys the after-susceptibility to the disease.

The latter variety is seen during an epidemic of measles, and we are justified in assuming a person to have it, if the catarrhal symptoms are as severe as if the patient had a measly rash, and if the person becomes non-susceptible to the disease.

The essentially severe form of measles, popularly termed "black measles," is generally associated with the hæmorrhagic diathesis. Before or after the eruption of measles, hæmorrhage occurs in various regions: in the skin, causing petechiæ or ecchymoses; in mucous membranes, causing violent bleedings from the nose, or in organs and cavities.

The general symptoms are those of a typhoid character; sordes on the teeth, small pulse, debility and diarrhœa.

Complications.—Catarrhal pneumonia, bronchitis, and laryngitis—an extension of the catarrh down the respiratory tract—are chiefly to be dreaded in measles. They appear after the eruptive stages, and intensify the fever and increase the danger. Of fatal augury are livid lips, cold extremities, and a rapid feeble pulse. Cerebral complications, peculiar forms of ophthalmia, dropsy, and albuminuria, are not unknown.

Prognosis.—As a general rule it may be stated that measles is essentially dangerous to very young children, and that the danger decreases rapidly with years, except in old age, when it may be fatal. Unusual sparseness or *purpuric* form of the eruption, or the hæmorrhagic diathesis, are bad omens. If the chest is only slightly affected, or not at all, we may predict a favourable result. The great danger is not in the disease, but in what it leaves behind it, such as lobular condensation or collapse of the lung, or a tendency to emphysema in after life.

Treatment.—As the greatest danger in measles is an extension of the catarrh to the lungs, all exposure to cold must be avoided. The room should be darkened, and the patient kept in bed. Milk diet, attention to the bowels, and a slight diaphoretic mixture, are all that is required in ordinary cases (F. 34). Trousseau has

recommended whipping the whole skin with nettles to bring out the eruption.

If there is severe coryza, warm water may be drawn through the nose. Emetics are useful at the commencement to prevent cough, and if diarrhœa be excessive (but only then) cold compresses should be applied to the abdomen and bismuth given internally. The inunction of vaseline with a little carbolic acid is often useful. If the temperature be high, quinine or antipyrin should be given; and if chest complications ensue, the principles of treatment mentioned under Acute Bronchitis should be adopted. Cough and hoarseness are relieved by painting the fauces with glycerine and borax and by the application of cold compresses to the front of the throat.

In the typhoid state associated with the hæmorrhagic diathesis, wine and stimulating expectorants are essential (F. 72).

RUBEOLA, RÖTHELN, RUBELLA

German Measles.—The term rubeola was brought into use by German physicians about the middle of the last century to designate a disease, which it was considered could belong to no one of the acute contagious or non-contagious eruptions, though closely resembling measles and scarlet fever.

Opinions with regard to it have greatly varied, but latterly it has been shown that it is an independent disease by distinct epidemics of it, and by the fact that while it ensures against a second attack of itself, it affords no protection from measles or scarlet fever.

Recognising it, therefore, as a contagious and essentially epidemic, and thus also specific, disease, it may also be noted that it is especially a disease of childhood, attacking indiscriminately boys and girls, and older and younger children, down to sucklings. A second attack is rare—as rare as that of measles. Its contagion is not quite so great as that of measles.

It consists of an eruption on the skin of numerous

discrete blotches, from the size of a pin's head to, at the utmost, that of a bean, slightly raised above the level of the skin, with at times a distinct, at others a faded border.

The spots are round or oval, and are well marked on the face, their colour being of a pale rose-red. They are seen on other parts of the body, especially on the neck, scalp, and thighs; while on the forearms, hands, and lower parts of the legs, they are not so common.

The eruption lasts usually for two days, and then disappears without any desquamation. The size of the spots is less than that of measles, the form being more round, and the colour paler.

The course of the disease in the majority of cases is as follows:—After the patients have coughed and sneezed somewhat, and manifested slight photophobia, from a few hours to a day, one notices—either at once, or after the attention has been excited by a gradually increasing temperature—the beginning of the exanthem on the face. While now the exanthem gradually spreads over the body, the temperature, if increased, becomes quickly normal again. Thus children generally object to stay in bed, and would prefer to be out of doors.

In ordinary rubeola there are no other local symptoms, except enlargement of the cervical glands, slight catarrh at times, some difficulty in swallowing, some diminution of the appetite.

Prognosis.—Its almost feverless course makes the prognosis most favourable, but the disease may be complicated with bronchitis, and may have a fatal termination.

Treatment.—The treatment of rubeola is restricted to a suitable regimen; protection against exposure, keeping the patient in bed, if feverish, and attending to probable catarrh of the air-passages and the pharynx.

Other complications, if any, should be treated according to their nature.

Sub-Group 1

CHOLERA

Synonyms, Asiatic Cholera, Epidemic Cholera.

The authentic history of cholera dates back only to 1817, when it made its first appearance in India. After a series of destructive epidemics in the East, it reached Europe, and was imported from Hamburg to Sunderland on October 26, 1831, thence spreading to the great centres of population in this country. This epidemic lasted during 1831-32, when there was a lull; the next epidemic being in 1848-49; the third during 1853-54; and the last during 1865-66, when it was chiefly confined to London.

Micro-organism.—There can be no doubt of the fact that a definite and morphologically distinct parasite exists in the discharges of cholera patients, and Koch describes the cholera bacillus as a short rod-like form curved or semicircular, thicker than the bacillus of tubercle. Such bodies often lie together with the concavity of their curves turned in opposite directions, and their extremities in contact, so as to form an S-shaped figure. They produce by division peculiar screw-like spirals, which remind one of the spirillum of relapsing fever, only that they are thicker. These parasites develop in the gastro-intestinal tract, on the interior of the follicles of the small lymph and blood vessels and of the subcutaneous connective tissue, and Koch states that by injections of pure cultivations of comma bacilli cholera can be induced in animals.

Animals so treated die in a short time; comma bacilli are found in the intestines in extraordinary numbers after death. If the parasitic origin of cholera is granted, it can be understood how in different degrees of vitality these germs can be carried by the air in viewless numbers, and impregnate the water supply, or be drawn directly into the mouth; the different degrees of vitality account-

ing, to some extent, for the choleraic diarrhœa which, as will be seen, always accompanies the true disease. Experience testifies that nurses and hospital physicians exposed to the concentrated miasma from the dejections, or washerwomen who wash the linen soiled with cholera dejections, rarely escape taking the disease when it is epidemic; while the fact of outdoor physicians attached to hospitals passing safely from bed to bed, and again out into the open air, seems to indicate that cholera is not contagious.

Cholera is more common in hot than in cold weather. Although common in childhood and adult life, it is pre-eminently a disease of between twenty and thirty. Excesses of every kind, whether of food, wine, or fruit, during the continuance of the epidemic, predispose to it. The average incubatory period is from twelve to twenty-four hours, rarely exceeding one week. About one-fifth of those attacked survive.

True Cholera.—*Symptoms.*—Diarrhœa of an epidemic character rarely fails to precede the real attack, and may last from a few hours to some days.

The symptoms of cholera vary greatly in intensity, especially in tropical countries. In many cases at the beginning of an epidemic the patient, apparently overwhelmed by the poison, falls down, and dies within one or two hours, without vomiting or diarrhœa. In typical uncomplicated cases, as observed among primitive races, the first symptom is always giddiness or swimming in the head; and in a short time the contents of the stomach are suddenly ejected without much nausea. A peculiar sensation of faintness or sinking is next experienced, and then the bowels are evacuated. In very severe cases the patient becomes pulseless at the wrist within one or two hours, and before the vomiting or diarrhœa has proceeded to any great extent a cold perspiration covers the body, and although the surface has the cold feeling of a dead body, the patient complains of an intense burning heat, and implores to be sponged with cold water. There is persistent vomiting and diarrhœa, with intestinal cramps;

the body becomes shrivelled and corpse-like; the bladder is empty, but there are intense and frequent calls to micturate; the voice becomes croaky; the carotids cease to pulsate, and death supervenes, the body having the appearance of being dried up.

In this country the attacks frequently commence during the night, and the symptoms are less intense. The patient awakes chilly and dizzy, and this is rapidly followed by a tempestuous diarrhœa, the early stools being black and pappy; but as the bile pigment quickly disappears, they exhibit the CHARACTERISTIC RICE-WATER APPEARANCE. They are passed involuntarily and painlessly, and in number vary from three to fifteen. After the diarrhœa has lasted one or two hours, vomiting, attended with no pain, sets in, at first of the food which may have been taken, and latterly assuming a colourless whey-like appearance. Intense thirst and suppression of urine are now prominent symptoms. The tongue is, as a rule, white. After a few hours distressing cramps supervene, especially of the calves and feet—rarely of the hands. Sometimes these are entirely absent, and the patient sinks without a struggle. There is also a considerable fall of temperature, commencing in the hands and feet, and most marked on the face, nose, and tongue. Should there be a tendency to recovery, the temperature approaches the normal; if it does not, the features become more pinched, the extremities more cold, livid, and collapsed, the eyes dry, and the cornea cloudy; the voice assumes a hoarse and raveny character, or it may sink into an inaudible whisper. This peculiar character has led to its being called "vox choleraica." This stage has been termed the algide or cold stage, and either terminates in death or passes into what is called the stage of reaction. The earliest sign of improvement, preceding even the abatement of the diarrhœa and vomiting, is the RETURN of the PULSE at the wrist. Heat follows, the blueness disappears, the temperature becomes normal, and convalescence may be regarded as perfect in from ten to fourteen days. Sometimes the improvement is only transient, being followed

by uræmia, or inflammation of the kidneys or intestines. During the attack proper the patient may die in from six to eight hours ; even in bad cases the usual time is, however, twenty-four hours.

Morbid Anatomy.—Cholera has no distinctive lesions ; the cadaveric rigidity is, however, marked. In the digestive tract the isolated and agminated glands are swollen and prominent, more especially the latter. At the ileo-cæcal valve, a whitish-gray fluid with fine granules and cell nuclei exudes if the follicles are pierced. These changes are seen during the first forty-eight hours. Afterwards the swelling diminishes, and the glands are shrivelled up, collapsed, and of a yellowish or slaty-gray colour. The brain, heart, lungs, and liver are usually found healthy, while the kidneys are larger than usual, and congested.

Treatment is of two kinds—prophylactic and therapeutic. During a cholera epidemic all unnecessary meetings, fairs, and pilgrimages should be abandoned. The *materies morbi* being chiefly contained in the dejecta, all excreted matter should be disinfected by chemical agents, or destroyed by fire, and none should be so disposed of as to contaminate food or water. Wells ought to be inspected, defective sanitary arrangements remedied, dirt of every kind cleared away, the sale of unripe fruits and vegetables prevented, soup-kitchens established, and the stamina of the poor built up. The prodromic diarrhœa should, if cholera appears, be checked as early and speedily as possible by, according to Lebert, some preparation of opium, given either by the mouth or the rectum (F. 16, 17, 18). Should these fail, we must now fall back on, or as some eminent English authorities say, commence with, a teaspoonful of castor oil or rhubarb.

The therapeutic treatment of cholera, when it has actually begun, is very unsatisfactory ; for the disease runs an extremely rapid course, and all medicinal agents are speedily rejected. Astringents are of no avail, and in fact do harm. While no distinct line of treatment applicable to all cases can be laid down, yet the following

course of procedure should, if practicable, be adopted. The first two or three hours are those upon which everything may depend. The physician should, if possible, remain beside his patient or patients for an hour or two, having a pocket case containing morphine, hydrocyanic acid, and carbolic acid of the purest quality, and be ready to administer these as occasion may require. F. 18*a* will be found very useful. Three or four minims of carbolic acid should be added to each dose. The first dose is generally rejected, but a second dose given immediately afterwards is usually retained. If a case is seen early and is amenable to treatment, there can be no doubt of the benefit of carbolic acid. After being given for an hour or two at regular intervals, the vomiting ceases, and fluids are absorbed; the pulse reappears, and there is a reasonable hope of recovery. Ice should be placed on the tongue every few minutes, and carbonic acid water drunk. The hypodermic injection of morphine may be used to allay the pain and cramps, and sinapisms applied over the abdomen, while the legs are rubbed with some stimulating liniment. Should the temperature begin to fall, enveloping the patient in a blanket wrung out of hot water and sprinkled with turpentine, together with the internal administration of the same drug, was, in my experience, successful during the last London epidemic. In rapidly sinking cases brandy or champagne may be given (F. 72).

When reaction sets in, a large spoonful of good beef-tea may be taken every three hours, and later on, tea or coffee with milk several times a day. From this we may pass to an increased and more solid diet.

What is termed the saline treatment of cholera consisted in giving in the early stages a Seidlitz powder, and after this had acted, plenty of thin beef-tea well seasoned with salt; thirst being relieved by Seltzer, soda, or pure water *ad libitum*. By the treatment in this stage a cure was often obtained; if, however, the stage of cramp had been reached, a solution of chloride of sodium ℈i, sodii bicarbonas ʒss, chlorate of potassium gr. vii., was given

every half-hour, by the mouth. If there were collapse and an imperceptible pulse, a strong solution of the same salts, dissolved in hot water at a temperature of 105° F., was slowly thrown up the rectum. This line of treatment is still by some strongly advocated, and astonishing, though unfortunately only partial and temporary, rallyings from the stage of collapse have been recorded.

"The best treatment of cholera," says Lebert, "therefore, in the state of existing knowledge, is a carefully-regulated hygienic and a correctly-interpreted symptomatic treatment, with avoidance of all perturbatory efforts, in the last degree inutile if not even injurious."

DIARRHŒA

We may state that diarrhœa is a prominent symptom in the following cases—cholera, sporadic cholera, cirrhosis of the liver, dysentery, gastric and intestinal catarrh, pulmonary tuberculosis in its late stage, and typhoid fever. Although in these diseases it forms only a part of a totality of symptoms, yet, when the discharge from the bowel is great, special treatment may be required for its relief. The character of the stools varies, and terms such as "liquid," "bilious," "mucous," or "thin mucous," are often employed to designate the different discharges from the bowels. Diarrhœa, moreover, apart from any other complaint, may occur in the dentition of children, in young persons or adults from errors of diet, and as the result of malaria or mental emotion. Sometimes it is vicarious, and dependent on the rapid suppression of discharges, or on the absorption of dropsical fluid. In all cases of diarrhœa the stools should be carefully examined, as much information can be obtained from their consistence and nature. After these remarks we shall proceed first to describe a severe form of diarrhœa which usually precedes or accompanies an epidemic of cholera, and hence it is termed Sporadic Cholera (*Synonyms*, Simple Cholera,

Choleraic Diarrhœa, Cholera infantum). It comes on suddenly, the stools being fluid, yellowish brown, and in number averaging from four to six in the first twenty-four hours. The characteristic distinctions between it and cholera are, that the diarrhœa does not merge, as in cholera, within a few hours into collapse; neither has the countenance the PINCHED WAN LOOK, nor the voice the CROAKY SOUND, nor the radial artery the PULSELESS FEEL of true cholera. The absence of these symptoms is striking, and eases the feelings of anxiety as to any diarrhœa occurring during an epidemic of cholera. This sporadic cholera, apart from any epidemic, may be observed in children in the first two years of their life, during the summer months; and it may also, though more rarely, attack adults as the result of over-indulgence in unripe fruits, or as a consequence of fatigue and errors of diet. In children and adults there is vomiting and severe diarrhœa. The vomited matters consist partly of the food taken and partly of slimy mucus. The stools are at first fæcal, but as the disease advances they become thin, of a rice-water colour; ultimately they may be stained with blood, and prolapsus of the bowel may occur from excessive straining. The prostration is great, the pulse small, the extremities cold. Dark pigmentation and sinking in below the eyes, with depression of the fontanelles, are characteristic and ominous signs. The thermometer introduced into the rectum will rise to 101° to 102°, or even to 104° F.

Treatment.—Active measures should be at once adopted, as expectant treatment may endanger life. It is first of all necessary in the case of a CHILD to put it into a warm bath at a temperature of 100° F., and to allow it to remain there for half an hour or longer. After the expiry of the time mentioned, the child should be carefully dried and placed in a bed or cradle. A large linseed poultice should be applied to the abdomen, and a powder made up of two grains of calomel and one of Dover's powder should be administered, divided in the following manner. If the child is under twelve months old, one-

third should be given every four hours. If the age is above twelve months, one-half the powder should be given, and repeated in six hours. In the former case two powders may be sufficient—the administration of the third being left to the medical adviser. Before the repetition of the powders the bathing should be repeated for the same length of time.

At the end of twenty-four hours a small dose of castor oil and a few drops of tinct. camph. co. should be given.

In the Sporadic Cholera of ADULTS opiates are essential, with catechu and chalk mixture, or with dilute sulphuric acid, sp. of chloroform, and peppermint water (F. 16 and F. 17), a dose of such mixtures being given after every liquid stool in a tablespoonful of brandy. Extractum Hamamelidis (Hazeline) and Chlorodyne can also be recommended.

Dietetic Treatment.—To adults give iced milk or gruel and soft-boiled eggs. The excessive thirst is relieved by cracked ice.

For a child not weaned breast milk is best; if weaned, then cow's milk, to which has been added lime water, and ice should be given at regular intervals. When the severity of the disease has abated, arrowroot well boiled with milk forms a pleasant change and a useful adjunct to the treatment. Trousseau recommended giving no food except raw meat grated into a pulp and mixed with powdered sugar, and this method of treating diarrhœa, especially in children, succeeds well.

Other forms of diarrhœa must be met by appropriate treatment.

1. In young persons of a robust habit no medicine may be required. The complaint wears itself out in the course of twenty-four hours, but if it extends beyond this period it is necessary to detect and obviate the cause by medicines.

2. Irritability of the bowels generally follows on any attack of diarrhœa, and it is proper to check this by an anodyne and demulcent mixture. A draught containing

chalk mixture, cinnamon, and opium is useful, and should be taken after every liquid stool (F. 17).

3. If diarrhœa continues long, and is accompanied by griping pains and tenesmus, astringents are not advisable, but a purgative medicine is indispensable to dislodge the acrid fæces on which probably it depends. Thus calomel three grains and rhubarb twenty, may be given with advantage, or half an ounce of tincture of rhubarb alone.

4. When diarrhœa is complicated with restlessness, a white tongue, and fever, it is advantageous to prescribe a diaphoretic first, and on the following day a demulcent and astringent mixture. Thus Pulvis antimonialis 3 grains and Pulvis Ipecacuanhæ Comp. 6 grains, may be ordered, and after the diaphoretic action has ceased, a draught of 10 minims of tincture of opium in half an ounce of almond mixture, may be given every four hours.

5. In elderly people diarrhœa, when it assumes a chronic form, is sometimes difficult to check. It is then necessary to prescribe more powerful astringents, as the compound powder of kino; or a mixture containing catechu, opium, and chalk (F. 17); or a starch and opium enema; or a pill of sulphate of copper $\frac{1}{4}$ grain, with extract of hyoscyamus 1 grain.

Diet.—In these forms of diarrhœa the food should be light and easy of digestion, as gruel, rice, sago, or tapioca pudding, or chicken broth.

DYSENTERY

Dysentery consists chiefly in inflammation of the mucous membrane of the large intestine. The inflammation rarely involves the deeper layers, or extends past the ileo-cæcal valve. It is supposed to commence in the solitary glands that lie scattered over the surface of this portion of the intestine. These become enlarged and prominent, looking somewhat like small-pox pustules. They probably form the foci for most of the ulcers, which are sometimes narrow and oblong, lying across the gut;

sometimes very large and irregular, with great patches of thickened mucous membrane. In tropical climates the liver is specially disposed to suffer, and ordinary or septicæmic abscesses may occur. So also the spleen or pancreas may be enlarged, softened, or indurated, and become the seat of abscess. The lungs may be similarly involved, and the bronchial tubes may be filled with puriform exudation, or fully-developed abscesses may be observed.

The site and extent of the ulcerations vary. The sigmoid flexure is a common site; the cæcum in certain cases and the rectum in others are principally implicated. In some severe instances the whole gut is covered with ulcers, while in fatal cases—Virchow's diphtheritic or gangrenous dysentery—the entire tract of the large intestine is a tattered mass of disorganisation, the natural appearance of the mucous membrane being lost. It is then covered with discoloured patches, with fibrous shreds, and commingled mucus, pus, and blood.

Dysentery not arrested in its early stage by treatment and not rapidly fatal is termed CHRONIC, and the condition is doubtless occasioned by structural changes in the bowel, *i.e.* thickening and imperfect cicatrisation of the ulcers and the permanently injured state of the glandular structures.

Dysentery may be either EPIDEMIC or SPORADIC. The former is peculiar to tropical climates, and seems dependent on a miasma emanating from the soil, attacking the system generally, and locating itself in the intestine; the latter may occur in all sorts of places, in adults as well as children, and is the result of the lodgment of masses of fæcal matter in the lower bowel, which act as foreign bodies, giving rise to inflammation ending in dysenteric symptoms. In neither form is the disease contagious.

Symptoms.—Dysentery begins in both its sporadic and epidemic variety with diarrhœa, after there have been irregular stools or constipation. There are also lassitude, want of appetite, and a listless attention to ordinary occupations. On the third or fifth day, usually in the night,

the diarrhœa becomes more severe, and attended with shivering or rigors. Pain is felt in the abdomen. The desire to go to stool is intense. Little fæces after a time are passed, and there is a straining or burning pain at the anus and rectum (tenesmus). With the disappearance of the fæces there appears bloody mucus, or pure blood, in the midst of which are often seen little white lumps, or round pieces looking like minced raw meat.

The patient may seek to go to stool from twenty to thirty times in a night, and then, as might be expected, becomes giddy and faint from loss of blood and exhaustion. The disease may last in this acute form from six to eight days, with remissions in the morning and aggravations at night. As symptoms of amendment may be mentioned alternations of mushy, even formed stools with the characteristic bloody mucous ones. In very severe cases the tenesmus increases; the dejections flow uncontrolled, and are largely mixed with blood, collapse sets in, and the patient dies of asthenia.

When the disease becomes chronic, it is very intractable, with frequent relapses, offensive discharges, and great pain and exhaustion. Sporadic dysentery generally terminates favourably. The mortality of the epidemic form may reach 40 or 50 per cent. In slight cases CONVALESCENCE is complete in about THREE WEEKS, medium severe cases in about SEVEN WEEKS. Severe cases, if they do not terminate fatally on the EIGHTH or NINTH day, may last an indefinite length of time.

Treatment.—During an epidemic of dysentery all unnecessary crowding should be avoided, and uncleanliness prevented. The discharges of the patient should be disinfected. Potatoes, salads, unripe food, greasy food, spices, or pickles, should not be taken; while ripe fruit and stewed apples are advantageous. Flannel bandages should be worn round the abdomen; and if the bowels are constipated a gentle laxative of rhubarb may be taken.

Should an attack of dysentery set in, the patient must remain in bed in a room of an equable temperature.

The remedy for Acute Dysentery is Ipecacuanha.

It is safe. It is simple. It is certain of success.. It cuts short inflammation, and it promotes repair, when inflammation has occurred, by granulation and cicatrisation of the ulcerated intestine. Further, it conserves the power of the constitution, and abbreviates the time required for convalescence. It decreases the frequency of chronic dysentery, and minimises the danger of abscess of the liver. It has notably lowered the mortality from the disease since it has been adopted in Anglo-Indian practice. Thus—

In the Bengal Presidency it has fallen from 88 per 1000 to 28.

In the Madras Presidency it has fallen from 71 per 1000 to 13·5.

The treatment by Ipecacuanha is appropriately initiated by the administration of a simple tepid water enema of from two to four pints. This clears away any fæces, and leaves the intestine ready for the special treatment, which consists of 30 grains of Pulv. Ipecac., with 10 grains of Sodii Bicarb. to counteract acidity, and ʒss of Syrup Aurantii to cover the taste. Should this draught be rejected, it should be repeated when the stomach becomes tranquillised. The patient after this dose must remain perfectly still, and for *three hours* refrain from drinking, but he may be permitted, if thirsty, to suck a little ice, or take occasionally a teaspoonful of water. Griping is relieved by placing over the abdomen spongio-piline wrung out of hot water, and sprinkled with turpentine. Arrowroot made with water at the expiry of the time mentioned may be given, or milk or iced gruel. In from eight to ten hours the ipecacuanha should be repeated in a 20-grain dose of the powder, and it is advisable to continue the remedy in diminished doses for some days; and even after the stools are healthy, to administer ten to twelve grains at bedtime for a night or two. As a rule the system is tolerant of the large doses, and vomiting does not occur. Surprising effects follow shortly on this treatment—the tormina and tenesmus subside, blood disappears from the motions, profuse perspiration

sets in, and a refreshing sleep is enjoyed. The *diet* should consist of milk, soup, and the yolk of eggs, so that small, not bulky motions, may be formed. It has been lately stated, that in the earlier stages of dysentery a saturated solution of sulphate of magnesium is very effective. The method of administration is to take a sufficient quantity of sulphate of magnesium to saturate seven fluid ounces of water, and to this saturated solution add one ounce of diluted sulphuric acid. A drachm of this solution is given every hour or two, until its effects have been manifested in the feculent character of the stools, and their freedom from blood and mucus; or until the temperature has fallen, and the pain and tenesmus have ceased. Then an ordinary astringent mixture of dilute sulphuric acid with tincture of opium is usually all that is necessary to complete the cure. It is imperative to diet the patient with great care. This mode of treatment is specially advocated in cases where ipecacuanha causes great nausea and vomiting and nervous depression, but it is very questionable if, except in such cases, it should be adopted.

If *Chronic Dysentery*, through lack of efficient or neglect of any treatment, ensues, the best remedy is a change of air; a sea-voyage often acts admirably, and an afflicted and broken-down patient after the expiry of a week or two becomes convalescent. Ipecacuanha may also be prescribed in gr. x. doses, or a teaspoonful of the Liquid Extract of Bael. Trousseau recommended Subnitrate of Bismuth in gr. x. doses, or a mixture of kino and catechu. Others speak highly of opium enemata (F. 22); or of a combination of sulphate of iron, glycerine, and water. Every imprudence in diet, or exposure to cold, must be studiously avoided; *e.g.* the clothing should be warm, with a flannel bandage worn over the abdomen, and the food taken must be bland and nutritious, so that no flatulence or indigestion may result.

Mineral Spas. — Spa, Franzensbad, Tarasp, and Marienbad, can be recommended in chronic dysentery.

Sub-Group 2.

Beri-Beri.—This is a disease of tropical countries, known in Ceylon, India, Japan, and Burmah, and on the west coast of Africa, where it is designated "The Sleeping Sickness."

Symptoms.—It is characterised by anæmia and anasarca, great debility, dyspnœa, præcordial anxiety, scanty high-coloured urine, and in some cases drowsiness and sleepiness. Numbness and paralysis of the lower extremities follow. Death in acute cases results rapidly, with signs of effusion into the pleuræ, the peritoneum, or cerebral meninges. In non-acute cases recovery is frequent.

No definite *cause* can be assigned for the disease, and so far as is known, it is due to undefined causes, atmospheric or earthy influences, which depress the vital powers, impoverish the blood, and starve the nerve centres.

Treatment.—Prophylactic treatment consists in good food, warm clothing, and strict attention to the laws of hygiene.

When the disease is established hot baths are useful, followed by diaphoretics, and afterwards stimulants—as turpentine. A medicine termed "Oleum Nigrum" is given by Indian physicians thrice daily, and in some cases it is successful.

ERYSIPELAS (Ἐρύω, I draw; πέλας, near)

Erysipelas is an inflammation of the skin, characterised by redness, swelling, and pain; and the researches of Fehleisen seem to show that its presence is excited by a "chain-forming micrococcus" in the lymphatic vessels, and serous canaliculi of the diseased skin.

The *specific organism* of erysipelas closely resembles the pyogenic micrococcus, but that it is different is evinced by the fact that it grows and conducts itself differently in various cultivating media, and its inocula-

tion produces a distinct train of symptoms. Cultured upon pure gelatine it invariably gives rise to erysipelas in rabbits which are inoculated with it. If we recognise, as we must do, the specific character of the organism in erysipelas, we are compelled to abandon the distinction between medical and surgical erysipelas. In both cases there must be a breach of surface to afford entrance of the organism into the system. This breach is patent in erysipelas following on surgical operations, but its existence is not always so evident when it ensues on no surgical procedure. Still, in the great majority of cases, especially upon the face, erosions can be detected in the mucous membrane of the nose, mouth, or eyes, and at one or other of these points the organism enters. In other instances, where no actual breach of continuity can be seen, "there is a strong presumptive evidence of its occurrence."

Various conditions seem to aid its development and augment its virulence, and these may be considered predisposing causes. Thus defective sanitary arrangements favour its occurrence, and if it assumes, as it sometimes does, an epidemic form, it selects persons living in unhealthy dwellings, and preferably those who are addicted to alcoholic excesses; those who are suffering from dropsy arising from renal, cardiac, or hepatic disease; women in the puerperal state, or all those who are poorly fed or clothed.

These so-called epidemics, experience has shown, are specially frequent when the wind is keen and cold, or when the weather is damp and depressing.

Antiseptic improvements in the treatment of wounds have notably diminished its occurrence in surgical wards, and the prompt removal of a case of erysipelas when it does occur to an isolated ward, has reduced to a minimum the chance of its spreading. It is noted that one attack of erysipelas does not protect a patient from its recurrence, but rather tends the other way. Acute attacks are most common in the period of active life from twenty to forty, and less acute attacks from fifty to old age. It may

occur in infants, but after infancy it is rare until adult life. The sexes are affected in equal proportions.

Symptoms.—In erysipelas there is a period of incubation which varies from a few hours to three or four days, and during that period the lymphatic glands of the part affected enlarge and become tender. Chilliness, nausea or vomiting, and sudden elevation of the temperature to 103° or 104° F., usher in the attack, and if the case is to be one of facial erysipelas, there is also a burning or pricking pain at its local site which generally is at the nose, less often on the cheek, the ears, or the hairy scalp. Any pronounced fold of the skin may for a time form a boundary line, beyond which the disease does not extend. The naso-labial folds or the border of the hairy scalp may limit it, but these limits may be overstepped, and the whole face and hairy scalp are involved in the inflammatory process. The features of the face then are indistinct, and the countenance is one red, bloated mass. As a rule, if it invades the scalp, the inflammation only stops at the nape of the neck. In a small number of cases it extends to the back, the arms, and even to the feet; and if so, the erysipelas is termed "migrans." When the spreading process is about to cease, the redness becomes less intense, appears only on particular spots, and finally stops completely. In some varieties of erysipelas vesicles and bullæ form on the portions of the skin attacked, and such cases are called erysipelas vesiculosum, or erysipelas bullosum. There may be pus formed from the blisters, when we have erysipelas pustulosum; and if the inflammation is so intense as to produce gangrene, we have erysipelas gangrenosum. The fever in erysipelas varies with the severity of the case, ranging from 102° F. to 106° F. The fever is not always continuous, for there are distinct intermissions and distinct exacerbations. The fever may terminate with a crisis, or in erysipelas migrans with a lysis. With the fever there is constitutional disturbance, the headache being intense, with delirium and restlessness; at times there may be distinct stupor. In facial erysipelas the gastric symptoms are evidenced by a

thickly-coated tongue, vomiting, constipation, occasionally diarrhœa.

Duration.—The course of erysipelas varies. A slight case may get well in a few days, but most cases of average severity last a week or more. Erysipelas migrans may continue for weeks. Local complications are rare.

Prognosis.—The prognosis is favourable in a healthy person, but in drunkards it may be complicated with delirium tremens, and the issue may be fatal. Erysipelas migrans may from its continuance exhaust the strength of the patient. Erysipelas may also be complicated with acute bronchitis, pneumonia, or nephritis.

Diagnosis.—Acute facial eczema or erythema, or even urticaria, may be confounded with erysipelas. A cautious diagnosis should therefore be given until the characteristic border and peculiar extension of erysipelas have been observed. Erysipelas may also be mistaken for scarlet fever, measles, or small-pox. The redness of scarlet fever is not, however, localised, and it is accompanied by throat complications. Nasal and catarrhal symptoms are observed with or before the eruption of measles. A small-pox pustule is never solitary, others may be seen in different parts of the body; and there are premonitory symptoms in small-pox, such as vomiting and pain in the back.

Treatment.—In all cases of erysipelas, simple or severe, it is well to act on the bowels, unless diarrhœa exists, by a powder of calomel and jalap (F. 23). When the cathartics have done their duty then the way is paved for the exhibition of the tincture of the perchloride of iron, in infusion of quassia. Thirty to forty minims of the tincture may be given every three hours until the temperature is lower, when the medicine may be taken in progressively lower doses, until convalescence is certain. Then the administration of iron may be stopped, and preparations of quinine ordered (F. 75). For headache and insomnia a full dose of Bromide of Potassium is preferable to any preparation of opium, yet when diarrhœa is a prominent symptom opium is more serviceable than any other astringent.

In a very severe case, when the fever is high and delirium and extreme restlessness are prominent symptoms, no remedy is more valuable than a cold bath of 80° F. for fifteen or twenty minutes. The patient bears this well, and if necessary it may be repeated twice or thrice in the day.

Instead of the iron treatment, some trust to quinine in a dose of six or ten grains every six hours, or to antipyrin or antifebrin. These remedies, however, in my opinion, are not so efficacious as iron in tiding the patient over a severe attack.

The *local* measures recommended are numerous, the most popular being a protection covering as flour, powdered starch, or oxide of zinc, to the affected part; or as more complete protection agents, a mixture of castor oil and collodion, or painting the surface with a solution of nitrate of silver. Ichthyol has lately been highly spoken of, not merely as a covering, but as acting directly on the micro-organism of the disease. An injection of carbolic acid, melting-point 40-42° C., in a two or three per cent solution at various parts of the raised margin, theoretically merits great consideration, and practically good results have occurred from its adoption.

In erysipelas of the leg I have repeatedly observed a good result from the application of solid nitrate of silver. An encircling band was made in such cases above the erysipelatous blush, and this line of demarcation prevented its extension.

Dietetic Treatment.—Solid food cannot be taken; yet, as erysipelas is a disease in which there is great exhaustion, the dietary should be specially attended to. Milk, beef-tea, eggs, should be given at regular and stated intervals; and also alcohol, if typhoid symptoms appear, the amount to be regulated by the state of the pulse and the temperature.

SYPHILIS

Syphilis is a chronic infectious disease, with different symptoms at different stages of the malady. As a separate and distinct disease, syphilis dates from the end of the fifteenth century, when a notorious epidemic of it occurred in Italy, which gradually became less malignant; and the physicians then inferred, falsely, as we now know, that it would wear itself out, and cease altogether to infect the human body. The disease is at the present day prevalent throughout the world, although its principal sites, for obvious reasons, are large seaport towns and great commercial centres.

The term *syphilis* seems to have been invented by Fracastorius, who in 1521 published a poem, in which he related how Syphilus, a shepherd, was stricken by Apollo with the new disease, which even then was not considered venereal. The most common designation for it was "lues venerea," which dates back to the time of Fernelius (1556); and this "lues venerea," or venereal disease, was held to include gonorrhœa and soft chancre. Ricord in 1831 established the distinction between them. Indeed, the conception of syphilis as a general malady, comparable with the exanthemata, had no existence until forty years ago.

The *bacillus* discovered by Lustgarten in the pus of syphilis affords a valuable indication of the disease, yet certain harmless organisms on the prepuce or vulva are liable to be mistaken for it. Indeed, the character of this bacillus has of late been much questioned, and other observers have regarded certain cocci as the specific excitants of syphilis.

Course of the Disease.—Incubation.—There is a period of incubation in syphilis like the acute contagious fevers; and it is strange that this fact, now so well known, should have been so long unrecognised.

Primary Stage.—The earliest symptom of syphilis is manifested at the seat of infection. It is called the

primary lesion, while the more remote symptoms, which appear elsewhere, are termed secondary. It appears as a flat red papule, at first small, soon increasing in size, and as it grows larger it becomes indurated, forming the hard base. After a week or two it may desquamate slightly, or thin moisture may leet from its surface, which afterwards dries into a scab; or it may continue to look shining and glazed; or it may become excoriated and slightly depressed in its centre. Then follow, a few days later than the primary lesion, swelling and induration of the lymphatic glands in the groin, when the genitals are the primary seat of infection, or in the glands of the axilla when an indurated sore appears first on the finger, or if on the lip those near the lower jaw. They do not suppurate. They feel hard, freely movable, and are seldom tender or painful. In these glands the virus multiplies for six or seven weeks, and then appears the *Secondary Stage.* This is ushered in by constitutional symptoms which vary;—sometimes with fever, sometimes with neuralgia situated in the temples and subject to nightly exacerbations, sometimes with swelling of the large or small joints. The syphilitic eruption appears on the skin generally in the form of rose-coloured spots, hardly raised above the surface in the early stage, disappearing on pressure. The chief seats of this eruption are upon the sides of the chest and abdomen, but sometimes it appears on the whole of the trunk—the neck and face being rarely attacked—or it may be seen as small dry elevations or papules (lichen), or as pustules (acne). Following on one of these primary eruptions there may develop a scaly or a vesicular eruption, the seat of which may become pigmented.

Concomitant Early Symptoms.—The fauces become early affected with swelling of the tonsils; the swelling being followed by small milk-white spots similar to those left by the application of Nitrate of Silver to a mucous membrane. These spots may invade the palate, lips, and inside of the cheek.

In cases of severe forms of eruption the eyes may suffer

within six months of the appearance of the disease. The affection is termed Iritis. It is usually bilateral, and may have a painless insidious origin. The lymph glands above the elbow, and at the back and side of the neck close to the occipital bones, also enlarge. Frequently, also, there is a "falling of the hair," which sometimes proceeds to baldness.

Later Symptoms.—After the lapse of six months the disease, properly treated, may take a favourable course, with disappearance of the symptoms and restoration to health in from ten to twelve months from the time of infection. But in most cases new crops of eruptions come and go on the skin and mucous membranes; and thus we observe small papules on the tongue, and scaly isolated patches of psoriasis on the palms of the hands, or other parts of the body. If the constitution be weak and scrofulous, eruptions difficult to heal may form.

Severe ulcerations may also be developed in the throat and nasal cavities, in which latter the bones may be laid bare and the nose become permanently depressed. Tumours may form in various internal organs, especially the liver, the testicles, and the brain, and from the semi-translucent aspect which they present, especially in the quite recent state and at the growing edges, they have been termed "GUMMATA." These "gummata" are not of the nature of an exudation, but consist of hyperplasia, increase of connective tissue elements. This increase begins in the walls of the vessels, and although at first soft and translucent, it afterwards becomes firmer and tougher, and dries up. Phthisis may now begin, with albuminuria and dropsy due to amyloid degeneration of the kidneys.

Constitutional syphilis may also be communicated from local secondary lesions, as by kissing, etc., by syphilitic nurses, by vaccination when blood is taken along with the lymph of the vaccine vesicle, etc.

The syphilitic cutaneous affections may be of various kinds; probably the squamous variety is the most com-

mon, appearing in patches of a coppery colour, and having the scurf renewed as fast as it is shed.

These eruptions may generally be diagnosed as syphilitic by the fact that they do not itch; by their dull coppery colour; by their more or less circular form and grouping; and by the brownish coloration the severer forms leave behind. Syphilis is often communicated to the infant through disease of either parent. In such cases, within a few weeks or months, an examination of the nates will reveal mucous tubercles, or red patches at the buttocks, ankles, or hands. Fissures may also be observed at the lips, nose, or angles of the mouth. The child also presents, if no treatment has been adopted, a pinched, young-old appearance; the skin hangs in loose folds, and there is a history of characteristic snuffles from birth, accompanied by a peculiar hoarse cry. As the result of this congenital syphilis the upper central incisors of the permanent teeth may have a peg-shaped form and notched appearance, and one or both eyes may be affected with a lingering inflammation of the cornea (Keratitis).

Treatment.—It is doubtful if the initial lesion can be destroyed at the seat of infection, opinions varying on this important point. Experience testifies that all treatment of constitutional syphilis is futile without the aid of mercury. How this remedy acts we cannot tell. There are five modes of employing it:—

1. By inunction; rubbing in some ung. hydrarg. every night, after washing the part with soap and water, and stopping the remedy whenever the mouth becomes in the slightest degree affected.

2. By hypodermic injection of the perchloride. An excellent method is to dissolve two grains of the perchloride in sixty minims of water. Then add to this solution forty minims of a filtered mixture of one part of white of egg and two of water. An albuminate of mercury is formed, which again is rendered soluble by the addition of a small quantity of a saturated solution of chloride of sodium. A clear solution is thus obtained, and of this three minims may be injected twice daily,

equal to $\frac{1}{24}$ of a grain of the perchloride. If five minims are used improvement on the syphilitic eruption will be manifested in a few days, and this without pain or any inflammation. Lately a solution of gluten-peptone sublimate has been prepared, and can be obtained from pharmacists. ·1 cg. (nearly $\frac{1}{8}$ grain of perchloride of mercury) is the dose for one injection. The most appropriate sites for injections by either method are into the connective tissue beneath the skin between the shoulders, or else beneath the muscles of the gluteal region.

3. By fumigation; 8, 15, to 20 grains of calomel being employed for this purpose. The patient, undressed and enveloped in a blanket, being seated on an ordinary cane-bottomed chair, the calomel, placed on a small metal vessel below which a spirit-lamp is burning, is sublimed in about fifteen minutes and deposited on the skin. This method may likewise be continued daily, until slight mercurialisation is produced.

4. By mercury being given in small dose, with Zittmann's decoction, which contains sarsparilla and other herbs (F. 8*b*).

5. By mercurial preparations internally, that one being chosen which can be continued for the greatest length of time without producing digestive derangements. Thus pil. hydrarg. is good, or hydrarg. c. cretâ, or the perchloride in the form of a pill, or in a mixture in doses of $\frac{1}{16}$ of a grain (F. 1, F. 3) thrice daily. The famous liquor of Van Swieten, still largely used in France, was made by dissolving one grain and a half of corrosive sublimate in three fluid ounces of corn whisky, which can be replaced by any other strong spirit, such as rum or brandy. The dose of this solution is from one to two fluid drachms, twice daily, after meals.

Iodide of potassium should be given alone for a considerable time afterwards. This remedy is specially serviceable in pustular eruptions and affections of the bones in the secondary and tertiary manifestations of the disease. If there is much anæmia, it may be combined with carbonate of ammonium or ammonio-citrate of iron.

Condylomata are best treated locally by dusting calomel or iodoform over them. For Keratitis, my experience at the Glasgow Eye Infirmary induces me to speak highly of small doses of hydrarg. c. cretâ and quinine, with the local application at first of atropine and subsequently of dusting with calomel.

In considering the different ways of getting mercury into the system, it seems to me advisable to state that my personal experience is in favour of the inunction or the injection method. By both methods the remedy is rapidly absorbed, easily eliminated, and there is little risk of producing salivation. The injection has the advantage over the inunction in being more cleanly, and its action more accurate and speedy; for after four weeks of the albuminate injection, or after injections of the gluten-peptone sublimate, disappearance of the syphilitic rash is apparent.

Some cases of syphilis seem to resist all treatment at home, and in these cases the patient should be recommended to proceed to Aix-la-Chapelle or Neuenahr. Undoubted and permanent benefit ensues from the inunction of mercury assisted by the sulphur baths at these spas. In six weeks a cure may be accomplished.

The patient should avoid sudden changes of temperature, go to bed early, and wear flannel. Beer and wine may be allowed, but no spirits. The teeth should be brushed daily with tincture of myrrh or with a solution of chlorate of potassium. The diet should be nourishing.

Sub-Group 3

HYDROPHOBIA—*Synonym*, Rabies

The term hydrophobia was first used by Celsus, and simply expressed one prominent feature of an affection, the pathology of which has ever remained obscure, viz. dread of water, or, it may be added, of liquids in any form. It is the result of the implantation of a specific

virus; this inoculation taking place most frequently from the bite of a rabid animal, especially the dog. The skin must be wounded; the spontaneous development of the disease is never known. Wounds so occasioned are more dangerous on the hands and face than on the lower extremities, probably because the clothing worn intercepts the virus.

After the infliction of the wound there is a stage of incubation, varying from six weeks to as many months, during which time the wound heals perfectly. After this a peculiar prickling sensation is felt over the site of the cicatrix, accompanied with general symptoms of restlessness, depression, and disturbed sleep. On these supervene the terribly significant phenomena of dread of liquids and intense thirst. As the disease progresses all attempts to drink are avoided. The sight even of a drinking-vessel containing water is intolerable, and the patient turns away his face, shrieking out at the slightest touch or breath of air. The muscles of the neck and trunk, and even the whole muscular system, contract spasmodically, with convulsive trembling of the limbs; at times, during the frenzical fits, snapping motions are made with the jaws, like biting. Although during the convulsions mental hallucinations occur, yet, in the temporary cessation from these, the patient responds correctly to questions, begs friends not to leave him, and, with a consciousness of impending death, may ask them to pray for him. The saliva is now greatly increased in quantity, and, as it cannot be swallowed, is ejected in all directions. The respiration is hurried, and accompanied with a sighing sob. This state may continue from one and a half to three days, and is succeeded by a stage of paralysis lasting two to eighteen hours, with an abatement of the distressing symptoms, but with greatly increased weakness, which deepens into death. The skin is covered with a clammy sweat, pulse small and irregular, saliva running from the mouth, and accelerated breathing.

The duration of the disease in hydrophobia is only from two to four days.

Treatment.—Pasteur's Treatment has rescued hydrophobia from the domain of incurable diseases. The principle of this method will be understood from what follows :—

1. From a bite of a rabid dog, and by the insertion of the saliva into the flesh, the poison of rabies is introduced into a human being. By the blood it is carried to the nervous centres of the brain and spinal cord, and after a certain period of incubation the symptoms of hydrophobia appear. If now a portion of the brain or spinal cord of a rabid dog is placed, after trephining, under the dura mater of a rabbit, rabies develops in about fifteen days. But the virus so communicated can be intensified in virulence, and to accomplish this the virus from the first rabbit inoculated is communicated to a second, from a second to a third, and so on until at the end of the fiftieth inoculation the incubation period is only seven days, and spinal cords, with a varying degree of virulence, are obtained rabic throughout their whole extent.

2. From one of these rabbits the spinal cord is taken, with due antiseptic precautions, and is suspended in dry air. The virulence, slowly disappearing, is finally abolished, and in this way the cords of rabbits can be had weak or strong with the rabic poison.

3. Clear soup is mixed with a fragment of cord, not in a very virulent state, and is injected under the skin of a dog. After an interval usually of two days, injections from more recent and therefore more virulent cords are used, until a time is reached when a portion of a very virulent cord is injected, *i.e.* of a cord which has only been kept in the dry air for a day or two.

4. The result is that the dog is completely protected. No symptoms of rabies can be produced either by the direct bite of a rabid dog or by the injection of rabic matter. Pasteur so experimented with fifty dogs without a single failure, and then he considered he would be justified in trying the experiment on a human being who had been bitten by a rabid dog.

5. The 6th of July 1885 saw the beginning of the cure of hydrophobia. An Alsatian boy (Joseph Meister), who had undoubtedly been bitten by a rabid dog, and whose condition was such as to justify the supposition that hydrophobia was incubating in his system, was brought into the laboratory of Pasteur. Half a syringeful of the soup in which a cord had been mixed after a drying of fourteen days was injected on the 6th, and on succeeding days injections were made from cords which had been kept for shorter periods, until at the end of ten days half a syringeful was injected of a cord which had only been kept for one day.

6. The experiment was successful. Joseph Meister did not take hydrophobia, and now the mortality from this previously incurable disease is reduced to a very small percentage. The Royal Commission sent out by our Government has fully corroborated the statements of Pasteur, and has given a highly favourable report, after long investigation and careful consideration of the issues involved.

TETANUS—*Synonym*, LOCKJAW

Tetanus may be either *idiopathic* or *traumatic*, and, speaking generally, in both cases seems essentially to consist in an inflammatory affection of the spinal cord. It is one of the most fatal of maladies, and in its *idiopathic* form appears to be induced by exposure to cold or damp, especially in those who have suffered from wounds; it has also apparently been caused by worms, by abortion, and by diseases of the womb. Many authorities are of opinion that tetanus is an infectious disease produced by the agency of the "Bristle Bacillus" of Nikolaier, which is somewhat longer and thicker than that observed in mouse-septicæmia. This opinion, however, has been questioned by Flügge, who states that, from experiments conducted by him, the bacillus cannot be held to be either uniformly or exclusively present in tetanus.

The first symptom is pain in the epigastric region,

extending backwards to the spinal column, and due to spasm of the diaphragm. Succeeding this are stiffness of the throat, fixedness of the jaws, and difficulty of swallowing. Sooner or later there follows tonic, *i.e.* continuous, spasm of the neck, back, and loins, causing the body to assume the form of an arch (opisthotonos). The skin is hot, the temperature high, from 105° F. to 110° F.; wakefulness, thirst, and constipation are also prominent symptoms. Strychnia poisoning may be mistaken for tetanus, but it is distinguished from it by this, *that there is no epigastric pain, spasms are more rapidly developed, and do not commence in the jaw.* The average duration of the disease is from three to five days. Hopes of recovery may be entertained if it extends over a week. Death results from apnœa or exhaustion.

Treatment.—This is very unsatisfactory. The favourite remedies, however, are Calabar bean, aconite, chloral, bromide of potassium, opium, and chloroform.

GLANDERS—*Variety*, Farcy

Etiology.—Glanders is a disease of the horse and some animals allied to it, as the ass and mule. This disease can be transferred to man by infection, usually from the pus and nasal secretions of diseased animals. A little of this secretion falls upon some excoriation or crack on the hand and is absorbed. The disease-producing agent is found to be a bacillus 2-3 μ[1] long and 0·3-0·4 μ broad, often carrying a spore at the extremity. It is found in the farcy buds and ulceration of Glanders, and also in the blood of persons suffering from that disease. These bacilli can be reared artificially, and if inoculated on horses and other animals give rise in every instance to typical glanders. Fortunately the disease is rare, and when it occurs it is among men attached to stables, as coachmen or grooms.

Symptoms.—Three to five days after infection local

[1] μ = 0·001 mm.

signs are seen at the seat of the injury. These consist of swelling and lymphangitis with pain. Then follows grave constitutional disturbance, evidenced by headache, fever, and pain in the limbs, while pustules and abscesses break out in different parts of the body. The nasal mucous membrane is the seat of ulcers, and from the nose there flows a foul-smelling discharge. The throat and larynx are also implicated with inflammation and ulceration, which spread to the bronchi, and diffuse bronchitis sets in, with vomiting and diarrhœa. The fever is high, the pulse rapid and small, and the patient becomes delirious and comatose. Death occurs at the end of two to four weeks in acute cases, but occasionally a chronic form of the disease is seen, with milder constitutional symptoms, which, after a protracted illness, ends in recovery.

Treatment.—In acute glanders we can only palliate; for the case from the first is hopeless. Palliation takes the form locally of cleanliness and disinfection of the nose, mouth, and throat with antiseptic lotions of salicylic acid or permanganate of potassium, and generally quinine and stimulants are given in large quantities. In the chronic form iodide of potassium and nutritious diet are advisable.

SPLENIC FEVER

Synonyms, Woolsorter's Disease, Charbon, Anthrax.
Variety, Malignant Pustule.

Splenic fever affects horned cattle, sheep, horses, and birds, in all parts of the world. It may commence by the formation of a pustule of a carbuncular nature, but usually, especially when the disease is rapid in its course and the animal is particularly liable to it, no pustule is observed. Sometimes animals are struck down when apparently well, but generally the temperature rises, they stagger, bleed from the nose and mouth, and quickly die. The presence of a *bacillus* in the blood of men and animals suffering from anthrax has been fully established, but in all cases

the number of these bacilli as seen in man falls far short of that witnessed in the case of animals, and it varies according to the part from which the blood is taken. It is found most abundantly in splenic blood. Observed microscopically the bacilli are seen to be motionless, rod-like bodies 5-12 μ long and almost uniformly 1 μ broad, slightly thickened at the extremities, and occasionally having the appearance of transverse segmentation towards the middle. They exist not only in the blood drawn from the body, but also in the organs of animals which die of anthrax. They can be also isolated and cultivated, and then produce infection, so that positive proof is obtained that they are the actual carriers of contagion. The bacilli live only a comparatively brief time when taken from the blood, but the spores have a great tenacity of existence. They may remain dried up for years, and when placed in favourable conditions, as to heat and moisture, they are brought to further development. If the spores are transferred to animals they develop into bacilli, and there can be little doubt that men and animals are as often infected by spores as bacilli. Direct inoculation in most cases affects human beings. Thus shepherds, farmers, and butchers, coming in contact with animals suffering from anthrax, are liable to infection through any little wound or scratch on the hands. Often the disease is caught by woolsorters, woolpickers, horse-hair cleaners, furriers, and tanners, who from their occupations have to deal with wool and hair of animals who have died from the disease. It is not likely that the virus can be absorbed by the unbroken skin or by the lungs, but it has been demonstrated that the intestine may afford ingress to the infectious matter, and that eating the flesh of an infected animal will bring on anthrax in man.

Clinical History.—Two distinct forms of anthrax in human beings are recognised.

1. Malignant pustule or carbuncle proper comes on the hand, the arm, or the throat, as a red pimple, in from three to seven days after infection. A vesicle forms from

the papule. It grows rapidly and becomes excoriated, and has usually an appearance of a brown eschar seated on a dark blue base. Swelling of contiguous parts is observed, while inflamed lymph vessels or veins radiate from the pustule, and the neighbouring glands are affected. Healing of the pustule may take place by sloughing, or by the eschar separating and the wound granulating, but in one out of three cases grave constitutional symptoms are manifested by great prostration, fever, delirium, diarrhœa, and coma. Death may ensue after a few days' illness.

2. In internal or intestinal anthrax the cutaneous disorder, if it exist at all, is marked by severe constitutional symptoms. It is ushered in with a chill and vomiting, which are succeeded by a moderate, painless, sometimes bloody diarrhœa, impeded respiration, and generally rapid collapse. The temperature is usually little elevated. In a few days death ensues.

Pathology.—In fatal cases dark infiltrated spots, with hæmorrhages, are seen in the mucous membrane of the small intestine, and sometimes in the upper part of the colon. The spleen is enlarged, dark, and congested. The lymph glands are swollen, and there may be ecchymoses in the kidneys, the brain, and the serous membranes. The specific bacilli are found in all the parts mentioned.

Treatment.—The treatment of malignant pustule in the early stage is by cauterisation with nitric acid or caustic potash. Subsequently the local treatment consists in ice, rest, and elevation of the part. The general treatment is stimulant, quinine and alcohol being given largely.

Prophylactic measures, from the nature of the disease, are strongly indicated, and the carcases of animals dying of anthrax should be thoroughly destroyed by fire. The law in France and Germany is stringent; in Britain it is much less rigorously enforced. Pasteur's experiments show that if the bacilli of anthrax are kept under cultivation for several weeks at an unchanging temperature of 106° F., they gradually lose their power of infection, although their external appearance is not changed. Inoculations made with the virus so cultured produce little

or no mischief, and it is affirmed that animals thus inoculated are not affected when exposed to infection with real anthrax.

DISEASES PRODUCED BY ERRORS OF DIET.

Sub-Group 4

Obesity (obesus, corpulent: from *ob*, by reason of, and *edo*, I eat).

Synonyms, Corpulence, Polysarkia.

As phthisis literally means a wasting of the body, so obesity expresses the opposite state, of extra-nutrition. It is characterised by an excessive development of adipose tissue, more especially in those situations where normally it is abundant, viz. subcutaneous, subserous, and intermuscular connective tissue.

As predisposing causes to obesity may be mentioned heredity, sex, and age. Excessive corpulence is more common in women than men, and generally occurs at the "change of life," viz. 40 to 45 years. Race and climate also play their parts in obesity. The Hottentot, the Hindoo among eastern races, the German, the Jew, and the Greek, of European races, become obese. While predisposing causes must be borne in mind in considering obesity, yet without doubt determining causes are more potent factors. Thus, excess of food and drink will lead to corpulence in those who are hereditarily inclined to it, or who are prevented by occupation or business from taking sufficient exercise to promote the oxidation of the tissues.

The fat of the body of an average male adult constitutes about one-twentieth, and in the female rather more, of the total weight; but in extreme cases of obesity one-half or four-fifths of the body weight may be fat. The symptoms of obesity need scarcely be alluded to, except in so far as they bear on the treatment of the disease.

Muscular energy is diminished by the fatty infiltration of the muscular tissues, and hence bodily exercise is avoided, and, if taken, may cause at first considerable dyspnœa and palpitation. The digestive process, through the strain thrown on it by excess of food, becomes impaired, and flatulence and constipation, or acidity and diarrhœa, may at intervals supervene.

The urine is generally acid, contains an excess of uric acid, and often, though in small quantities, sugar. The vessels share in the malnutrition of the body, and atheroma of the arteries is often found, while the veins become distended and varicose, forming hæmorrhoids and varicocele. The obese person, even more than the one who is thin, is liable to attacks of acute diseases, and from the general weakness of the tissues these generally run a very unfavourable course.

Excessive corpulence should give rise to a grave prognosis, for rarely do very obese persons reach advanced age. They may be cut off by an intercurrent disease, or die from the disease itself by syncope, from a fatty heart; by apoplexy, from the degeneration of the intracranial arteries; or from bronchitis, resulting from cardiac dilatation.

Treatment.—Avoiding anti-fat nostrums, the corpulent person should carefully study diet. He should not take fatty and starchy food. Lean meats, sweetbreads, fish, except salmon and eels, clear soups, poultry, eggs, game, cheese, green vegetables, toast, gluten bread, fresh fruit, and pickles are allowed. On the other hand, potatoes, sweets, sugar, carrots, butter, and fat meat should be eschewed.

The less liquid taken the better, even water should be drunk in small quantities, and not with, but after, meals, say half to one hour. Alcohol in any form, but especially as beer, porter, champagne, port, and fruity wines, increases corpulence. Tea and coffee are supposed to interfere with tissue change, and therefore should be taken sparingly. The same remark applies to milk, which to a great extent is inadmissible from the fat which it contains.

The dietary given was the basis of the treatment of Banting, but since his time two other methods have come into vogue: (*a*) Oertel's consists chiefly in diminishing the quantity of liquid taken, and enforcing exercise at first on level ground, and then on gradually increasing gradients; (*b*) Salisbury's consists in frequent draughts of hot water not with food, but *two* hours afterwards; the patient's diet being in the main lean meat and green vegetables. As bearing on all treatment the observation of Celsus is suggestive "that bodily exercise will undoubtedly prove very advantageous, as we see fat horses getting lean by heavy work. Thus, likewise, those will never get fat who are obliged to toil with heavy labour."

Of medicines iodides and alkalies are sometimes prescribed in large doses. The preparation of Fucus Vesiculosus (sea wrack) in the form of the liquid extract ℥i to ℥ii before meals, from the iodine contained in it, also tends to reduce obesity.

Mineral Spas.—Marienbad in Bohemia, with its alkaline aperient waters and restricted diet, can be highly recommended; also, but to a less extent, Carlsbad, Kissingen, and Homburg.

SCURVY

Scurvy is a disease of great antiquity. It is alluded to by Pliny, and at different times it has proved very fatal both by land and sea. It is essentially dependent on the want of fresh vegetables as an article of diet, and although it has frequently occurred on land, it is pre-eminently a sailor's disease. Other causes than that mentioned may predispose to the disease, such as great privation, bad food, a marshy soil, and defective hygienic conditions; but these by themselves will not specially originate it. That which produces scurvy is essentially the want of a vegetable diet.

While thus aware of the cause of scurvy and the means of preventing it, we are ignorant of the exact

changes which it originates in the system. Different statements have been recorded by different observers. The blood seems to undergo some change. Older writers stated that the blood deposited a black muddy sediment, subsiding from a reddish serum. Later writers explain the thickened crassamentum by stating that the cohesive power of the fibrin is so much lessened as to prevent its being separated from the red corpuscles, and that this probably explains the meaning of the terms, so often mentioned, "agglutinated blood" and "thickened crassamentum." Dr. Garrod views scurvy as essentially due to the want of potassium salts in the blood, through the food being deficient in them.

The symptoms of scurvy are well marked. They come on gradually with weakness, anxiety, bad breath, a sallow muddy complexion, and the appearance of blotches on the legs. Some pains of a wandering character are felt all over the body, while the temperature is lower than normal, an evidence of deficient vitality.

As the disease advances, the gums become swollen and spongy, bleed on being touched, and are said to present an appearance similar to that seen when a patient is salivated. As the disease reaches an advanced stage the teeth rot from their sockets, and hæmorrhage takes place from the mouth, nose, stomach, and intestines. The debility becomes extreme, and petechiæ, developing into ulcers or ecchymoses, form on the lower extremities.

A friend who was much exposed to Arctic privation, and who was surgeon to a ship when a fatal attack of scurvy broke out, thus describes the disease:—

"The men were listless and dispirited before there were positive indications of scurvy. They could scarcely drag their legs along, and were unable to go aloft, or, if they did so, this was attended with great pain and marked debility. The pain seemed rheumatic in its character, and was always worst at night. The countenance was sallow and muddy long before the actual manifestation of the disease. The pain was at first confined to the extremities, and upon these the effusion of blood first

occurred, generally in the form of small petechiæ, which afterwards developed into vibices, and sometimes into ecchymoses. A bruise, a rebound from a rope, or any small injury, occasioned a steady development of an ulcer. Sometimes there was extensive and diffused infiltration beneath the subcutaneous and intermuscular areolar tissue.

"The limbs, especially the calves of the legs, then became as hard as a board, while above the induration the skin was either immovable and unaltered in colour, or had blood effused under it.

"When a fatal termination ensued, it either did so from extreme exhaustion or general dropsy, unless the patient was cut off at an earlier stage by pleurisy, pericarditis, or profuse bloody diarrhœa."

Pathology.—The pathology of scurvy is not well understood. It has been supposed that the disease depended upon a deficiency of potash in the system, because potash in the urine of patients suffering from scurvy is markedly diminished. But this theory is negatived by the fact that large quantities of beef-tea, containing a great quantity of potash, fail to cure the disease, so also does the administration of the salts of potassium. The probability is that scurvy is due to an increase of the chlorides in the blood, and especially chloride of sodium, at the expense of the alkaline salts. The excess of chloride of sodium causes the blood corpuscles to pass out of the vessels, and leads to extravasation and ecchymosis, which form prominent symptoms of the disease.

Treatment.—Lime juice, by its constitution, is supposed to have a decided action in preventing scurvy, which is now rarely seen except at sea. Hence, the mercantile marine and navy regulations of this country advise the administration of the juice in ounce doses daily, commencing ten days after the vessel has left port. Like many others, I implicitly accepted this statement as a truthful therapeutic canon, and in former editions of this book I inferred that it was a breach of the regulations mentioned which produced scurvy. As the result,

however, since then of a number of official inquiries, instituted by the Board of Trade, and conducted by me at Greenock, in outbreaks of scurvy occurring on homeward-bound vessels, I have been compelled by the evidence produced to question the efficacy of "preserved lime juice" as an antiscorbutic. The following facts were gathered from the inquiries in question: "That the juice would neither prevent scurvy originating, nor cure it when it had begun, during long and protracted voyages."[1]

The inquiries mentioned were chiefly concerned with ships sailing from various ports of the United Kingdom to Java or Moulmein, and they carried from the port of embarkation sufficient lime juice—fortified by 11 per cent of alcohol—to last them on the outward and homeward voyage. No case of scurvy occurred on the outward voyage, but it was on the return voyage, and about a month or six weeks after leaving Java or Moulmein, that the outbreak commenced, and invariably attacked at first men who seemed to be out of health. Strong men, however, towards the end of the voyage, were not exempted from the disease. In some cases the scurvy proved fatal, in others it completely disabled the men from active work. I found that the lime juice was not deficient in quantity, that it had been carefully served out according to the regulations, and that even the quantity had been doubled and trebled to the men who were sick, in the vain hope, as it proved, of arresting the disease. The lime juice was found on all occasions but one to be good, and in that one it was certainly decomposed, and unfit for human use, as was testified by the city analysts of Glasgow.

The dietary of the ships so infected, as shown by the provision list, the log-book, and the evidence of the captains and sailors, was unvaried, and consisted simply of salt meat and biscuit, as ordered by the mercantile marine regulations. The meat was found to be wholesome in character, the biscuits unmoulded, and the water pure and good; but the monotonous nature of the diet seemed

[1] As mentioned in reports sent to the Board of Trade at different inquiries.

to be the real originating cause of the scurvy, and the extra allowance of lime juice given, when the men were attacked, failed in every case to arrest the disease, or even to mitigate the symptoms. When they reached port and obtained fresh provisions the improvement was marked and rapid. I am bound to tell this fact, that all the ships were "temperance ships," and that no grog was served out at any time to the men, a form of abstinence which many captains in the merchant service believe to be a prominent cause of scurvy.

The vessels of all other countries but our own rely for the prevention of scurvy on a varied diet, consisting of a liberal supply of preserved vegetables, as well as animal food, and the result of this is, that on their vessels scurvy is an almost unknown disease. Were our ships prevented from proceeding to sea unless they had a due supply of preserved vegetables, sufficient to give them a varied diet, both in the outward and homeward voyage, it is to be inferred that they would have the same immunity, and that outbreaks of scurvy would be unknown in the annals of our mercantile marine. I would only add as a query for investigation—Is the lime juice sufficiently fortified by 11 per cent of alcohol to retain the antiscorbutic properties (which undoubtedly it possesses when fresh) during a long voyage, chiefly in warm latitudes?

From the description of scurvy, and its causes, there are certain obvious indications for *treatment*. Rest is necessary, and the low vitality of the patient requires this rest to be in a warm atmosphere. Antiscorbutics should be administered, such as potatoes, new lime juice, oranges, or the FRESHLY-squeezed-out juice of watercresses, mustard, or horse radish. The extract of these latter plants is useless.

The *diet* should consist at first of soups and milk; afterwards, when the digestion has improved, fresh meat and vegetables should be given.

As a local treatment for the ecchymoses and infiltrations, lotions and compresses of aromatic vinegar and spirits of camphor have a high reputation.

Dr. Garrod's theory indicates the administration of the tartrate or chlorate of potassium, to prevent or cure the disease. The barm of beer is also highly recommended, and of this six or eight ounces may be taken daily as an antiscorbutic.

DELIRIUM TREMENS

may be defined as alcoholic poisoning, attended with a delirium in which there are great restlessness, suspicion, trembling, and various delusions.

Etiology.—The disease is caused by the abuse of alcohol: distilled spirits more surely than wine, wine than beer. The man, it may be added, who, with a highly-wrought nervous organism, drinks to excess to drown the consciousness that he is drinking, is more likely to be affected with delirium than the habitual drunkard, who may drink to excess, but is able to sleep it off.

Symptoms.—Sleeplessness is the most characteristic symptom, and this sleeplessness is associated with busy restlessness, a chattering tongue, fidgety hands, and imaginary spectra. The tongue is protruded in a tremulous way, as in fever, but it is not brown and parched, but moist and creamy. The pulse is soft and compressible; the skin often bathed in perspiration.

The patient may reply coherently to a question or two, but soon after relapses into the fancies characteristic of the disease. These fancies are not pleasant, but associated with the lowest and most repulsive forms. Thus rats, mice, serpents, and imaginary demons, are crawling about him, and in endeavouring to escape or to destroy these his mind is sorely tried. Often he peeps suspiciously behind the curtain, draws the bedclothes over him, or attempts to leave his bed. Cowardice rather than violence is exhibited both with regard to himself and his actions towards others.

The disease tends to recovery, on the third or fourth day, by a sleep from which the patient awakes refreshed. In fatal cases the symptoms are aggravated, and attended

with intense watchfulness, low muttering delirium, subsultus tendinum, and great exhaustion.

Pathology.—The subarachnoid tissue has been found so infiltrated with fluid as to raise the arachnoid above the level of the convolutions. The cerebral arachnoid may exhibit considerable opacity all over the hemisphere, and the ventricles may contain a small amount of fluid, while the cerebral arteries and other parts of the brain are perfectly healthy.

Treatment.—The objects in treatment are, to prevent the further introduction of the poison into the system, to quiet the nervous excitement, and to sustain the strength while the accumulation of alcohol is being thus eliminated from the system.

To fulfil these indications, all stimulants should be forbidden if the patient is young and strong. If there is a history of previous attacks, and the patient is weak, it is advisable to withdraw them gradually.

If the patient can be persuaded to take some beef-tea or chicken soup, there is not much danger in the disease nor necessity for medical treatment. If, as often happens, there is loathing of food, it seems advisable to place six grains of calomel on the back of the tongue. The liver is thus stimulated to action. In young subjects opium may not be necessary, but in old subjects opium with some stimulant is the best remedy. Thus 40 or 60 minims may be given of tincture of opium, and it should be repeated at intervals of six, four, three, or even two hours, until its effects have been produced, and then every twelve hours. The patient, while under its influence, should be carefully watched. Some prefer to give it with antimonial wine (F. 70); or, should the stomach be irritable, to substitute hypodermic injections of morphine. In whatever form the remedy is administered, it must be remembered that the object is to produce sleep; yet if the pupils are contracted under its use without sleep, it has been pushed far enough and its use should be discontinued. In young subjects, provided there is no obstructive heart disease, chloral acts well. Thirty grains

may be administered in a draught, and may be followed in two hours by the same dose. Should no sleeping effect be produced, and should excitement be more marked, it is inadvisable to continue it. Many prefer to continue it in smaller doses with the bromide of potassium (F. 69). Nourishment as indicated should be given often and cautiously.

All force, as in the form of strait jackets, should be discountenanced. The services of well-skilled attendants, combined with kindness and humouring of the fancies, seem to be sufficient, even in the most violent cases. It is well not to restrict the patient from reasonable muscular exercise, and this conduces to sleep and appetite.

DISEASES NOT CLASSIFIED

RHEUMATISM

The word *rheumatism* is derived from ῥεῦμα, a fluxion, on the supposition of old writers, that it was due to an acrid humour, generated in the brain, and flowing into various parts of the body. This idea has been abandoned; yet, though the name is retained, much and varied speculation exists at the present day as to what causes operate in determining its predisposition for the white fibrous tissue which enters into the composition of sheaths, fascia, fibro-serous membranes, and ligaments of joints; and also as to its frequently implicating in the acute form the heart and its coverings.

Etiology and Theory of Rheumatic Fever.—Exposure to cold or wet and sudden chills are the most important factors in causing rheumatic fever. Predisposing causes are a previous attack; personal susceptibility or hereditary predisposition; scarlet fever, during the stage of desquamation; the puerperal state, especially in those who have lost much blood through natural labour or miscarriage; dysentery, after the disappearance of the

acute symptoms. The lactic acid theory still seems to hold the field as being the best explanation of the causation of rheumatic fever. It was originally suggested by Prout that in rheumatism the blood contained a superabundance of lactic acid. Dr. B. W. Richardson in 1858 published a series of experiments upon dogs and cats which appeared to him to show that the injection of lactic acid into the peritoneum produced endocarditis and not peritonitis. Reyher, however, three years later, demonstrated that the appearances described by Richardson are constantly seen on the cardiac valves of dogs when no lactic acid had been injected. Thus the lactic acid theory was discredited, but observers in England and Germany have testified that lactic acid given for another disease, as diabetes, has set up painful swellings of joints and symptoms of acute rheumatism. Senator has also given the weight of his authority to the lactic acid theory, plus a "personal susceptibility" to the disease. He states that under the influence of cold the lactic acid, always formed in active muscular exertion, fails to be eliminated by the skin or destroyed by oxidation, and that it accumulates in the system and acts as an irritant to the tissues of joints, so setting up an attack of rheumatism. He accounts for rheumatism not following on a Turkish bath—1*st*, By stating that the perspiration induced by the hot room in the Turkish bath is only condensed vapour, not similar to that connected with active muscular exertion. 2*dly*, The friction and shampooing and gradual cooling down prevent the untoward results which might otherwise accrue.

Rheumatism is most commonly divided into acute and chronic. The general and local symptoms in ACUTE RHEUMATISM are well marked. There is usually a feeling of coldness, want of appetite, thirst, and more or less feverishness, attendant on or caused by exposure to cold or wet. Pain is experienced in one or more joints, and is followed by inability to move, and by swelling and great tenderness. The large joints may be implicated, but the disease usually attacks the middle-sized ones. Hence

the knee, ankle, wrist, and elbow are the chief seats. The disease *tends to shift from one joint to another*, and does not often remain fixed in the one first affected.

When the disease is thoroughly established the pain is severe, and is intensified by the slightest movement. The pulse is full and quick, and the fever is attended with a peculiar acrid, copious, and sour-smelling sweat. This sweat, which may almost be regarded as pathognomonic of the disease, seems neither to mitigate the fever nor relieve the pain. The bowels are constipated, and the urine is high-coloured, scanty, and deposits a quantity of urates on cooling.

Unfortunately the disease is not limited to the joints. It has been found that in three cases out of four of acute articular rheumatism with high fever, the heart is affected by endocarditis or endo-pericarditis, and the foundation is laid for permanent chronic valvular disease. The cardiac complication is insidious, and frequently attended with no pain, and may not in its early stage be discovered on examination with the stethoscope; it sets in, as a rule, about the seventh day. While pneumonia is rare, pleurisy with effusion may complicate matters.

The temperature ranges from 100° to 104°, gradually ascending for at least a week, and is subject to considerable variations. Sometimes it reaches as high as 108° or 109°, and then death quickly ensues. The amount of urea excreted is very high, reaching in an average acute case to 800 grains daily, nearly double the standard of health.

The duration of the attack varies from three to six weeks. Relapses are common, and although five to six weeks is the usual limit, the attack may extend over some months, as it has no fixed epoch for its departure. The termination is generally in recovery, but often a joint or joints may be left stiff, or may become chronically enlarged. The average number of deaths is usually 1 in 1000. Rheumatism is not thus so serious in itself as in the after-mischief which it entails by cardiac and other complications. A variety of subacute rheumatism sometimes met with during an attack of gonorrhœa is termed

"gonorrhœal rheumatism." In this form the disease usually locates itself in one of the large joints, as the knee, which becomes the seat of considerable effusion and swelling. This swelling, which is great and rapid, may appear at any period of an attack of gonorrhœa, but as a rule it is most often noted when the discharge is disappearing, or has ceased.

In CHRONIC RHEUMATISM there is subacute inflammation of one or more joints, notably the knee, ankle, and shoulders; and the pain, which is more or less constant at all times, is aggravated by changes of weather, and is accompanied by swelling. The structural changes are those of chronic inflammatory irritation, attended by thickening of the cartilaginous and synovial tissues, which thickening extends subsequently to the capsule of the joint and the neighbouring structures, but shows little tendency to the formation of a liquid exudation, especially of a purulent kind. Sometimes, in consequence of this thickening, and through coalescence of the membranous elements of the articulation with the soft parts lying over them, the joints may become stiff; the cartilages may be frayed out, and ultimately worn away; abnormal adhesions may form, and permanent anchylosis result. Generally speaking, in chronic rheumatism one or more joints are constantly tender and painful and swollen. Stiffness and grating may be detected after a night's repose, and many patients are warned of approaching changes of weather by abnormal sensations in the affected joints; hence the term "prophetic joints." At the same time, it must be remembered that chronic rheumatism is peculiar to the latter half of life; that there is no attendant fever; that it never shifts quickly from joint to joint—never attacks internal organs; and these characteristics, with its tedious course, sufficiently distinguish it from the acute variety, which, however, may supervene at any time on the chronic form. The prognosis is favourable to life, but unfavourable as regards complete recovery.

A form of chronic rheumatism is termed Lumbago. The lumbar muscles are here the seat of pain, which is

continuous in character and much increased by exertion. The mere act of straightening the back often causes great agony. When rheumatism attacks the thorax, and the pain is spread over one or more branches of the intercostal nerves, it is termed Pleurodynia.

A connecting link, somewhat difficult to describe, exists between the general type of chronic rheumatism in its advanced stages and a peculiar variety allied both to gout and rheumatism, and termed osteo-arthritis (*Synonyms*, Arthritis nodosa, Arthritis deformans, Rheumatoid arthritis, nodular gout). It is essentially a disease of the poorer class, and prolonged exposure to cold and damp is

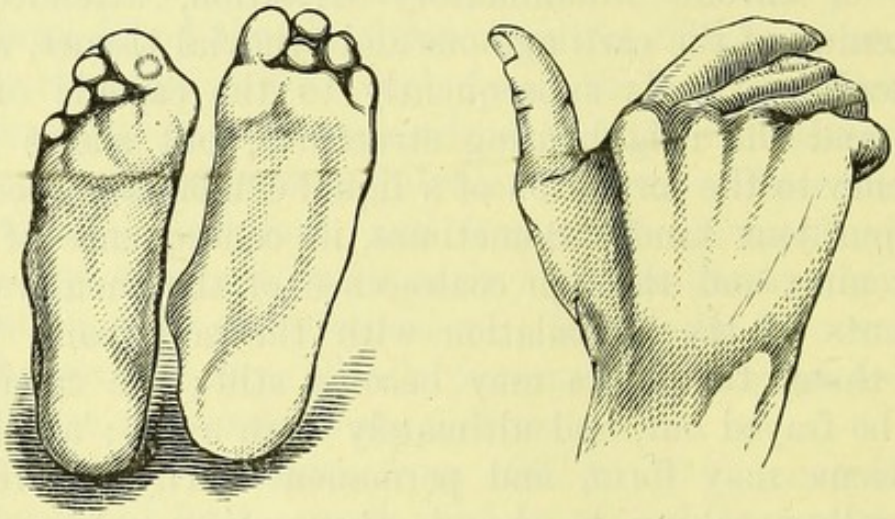


Fig. 5.

one of the chief causes to which the malady is ascribed. Youth and childhood are exempt from it, and it more commonly exists after the thirtieth year, selecting the joints most continuously and severely overtasked by manual labour. The disease comes on very gradually, the earliest symptom being pain in one or more joints, which pain appears and disappears without any appreciable cause. In the course of weeks or months stiffness is apparent in the joints affected, and the articular ends of the bones become thickened, and grow steadily larger as the disease goes on. With their enlargement the muscles covering the joints waste, and deformity ensues, this deformity in the smaller joints being symmetrical in character. Thus the fingers in the hands are displaced

and arranged in a twisted manner over one another either towards the thumb or little finger, so that the hand frequently becomes like a bird's claw. While the thumbs are usually spared, their homologues, the great toes on the feet, are more frequently and severely attacked than their neighbours. The annexed woodcut fairly represents "arthritis deformans."

The course of the malady, though exceptionally slow, is usually progressive. When once fully developed it is never known to recede, though months and years may elapse before fresh joints are implicated. Roughly speaking, it runs its course without fever or much constitutional disturbance, and treatment exerts little influence on it. All the constituent parts of the articulation—cartilage, bone, and synovial membrane—are implicated in the inflammatory process, although the actual beginning commences in the cartilages, with overgrowth and subsequent ossification, especially at the free borders, leading to easily detected nodular masses of bone.

Treatment.—The varying course and duration of this disease for a long time clouded the actual value of medicinal agents, and hence a shifting therapeutics has characterised the treatment of ACUTE RHEUMATISM. Without entering into details we may say that its treatment has exhibited five distinct epochs—(1) the antiphlogistic, (2) the alkaline, (3) the blistering, (4) the expectant, and (5) the salicylate. Each of these modes has had its advocates, but we may now confidently state that statistics show the superiority of the salicylate to the other means of treatment, first, in diminishing the pain; second, in lowering the temperature; third, in hastening convalescence.

By the salicylate treatment is meant the administration of salicin or the salicylate of sodium (natural or artificial). And with regard to salicylate of sodium we may say that the natural salt is much more expensive than the artificial, and that it possesses no greater efficacy than the artificial, if the latter be prepared from pure salicylic acid having a melting point of 157° C. It is then, like the natural salicylate, *physiologically pure.*

The question in treatment therefore resolves itself into the administration of salicin or salicylate of sodium, and priority may be given to the salt because of its readier solubility and quicker absorption.

1. Choosing, therefore, the salicylate of sodium as the remedy to be administered, we should give it dissolved in water in twenty-grain doses every two hours. Unless cardiac complications exist, this will be followed by lowering of the temperature and abatement of the pain in forty-eight hours.

2. After forty-eight hours the salt should be given in the same doses every four hours for two days and then every six hours for three days. At the expiry of five days it should be continued in ten-grain doses thrice daily, and then stopped altogether. A mixture of iron and quinine should afterwards be ordered to assist convalescence.

3. If at the expiry of forty-eight hours it is found that the temperature has not been lowered, this indicates that in all probability the heart is affected even though no evidence of this is afforded by auscultation and percussion. The medicine should then be discontinued, as its continuance could not do any good. In place of it large warm poultices should be applied over the cardiac region, and morphine at first injected subcutaneously and afterwards given by the mouth in such strength and frequency as to keep the patient free from pain and afford rest. For further treatment see Pericarditis (p. 249).

4. See that the salicylate is properly eliminated by the system. This is readily done by testing the patient's urine with the tincture of the perchloride of iron, which gives to it a purple colour.

5. If salicin should be preferred, the dose required at the same intervals and for the same length of time is twenty-five instead of twenty grains.

6. If this mode of treatment be adopted with the precautions mentioned as to heart complications, there is little chance of any relapse, and progressive recovery may be confidently expected.

7. Should a high temperature, 108° or 109° F., set in at any time it indicates cerebral complications, and the only hope of averting a fatal issue is by at once placing the patient in a cold bath as mentioned under typhoid fever (p. 51). By this means and by the application afterwards of ice to the shaven scalp it is possible to lower the hyperpyrexia.

8. The internal treatment may be supplemented by the application of liniment of opium, belladonna, and chloroform to the affected joints. A one per cent watery solution of carbolic acid has been recently recommended, or painting the joints with the same acid and linseed oil in the proportion of 1 to 15. The patient should always lie between blankets. The perspiration is thus absorbed, and there is greater comfort and less risk of catching cold.

Diet.—All nitrogenous food during the acute stage does harm, and the diet should mainly consist of milk at stated intervals supplemented by chicken soup. Lemon juice may be given as a drink in the quantity of two or three ounces daily. Action of the bowels should be solicited daily by a mild saline aperient given in the morning, as citrate of magnesium. Convalescence should be aided by fish and white meat, as boiled chicken or roast mutton with three or four ounces of claret daily. Eggs should be avoided.

While we consider the salicylate treatment of rheumatism undoubtedly superior to the alkaline, we still deem it advisable in a few words to describe the latter method. It is affirmed by those who employ it that the heart is only implicated during the first week of the disease when the fever is high and the urine acid, and that it is not attacked when the urine is alkaline. Therefore to render the urine alkaline two scruples of the bicarbonate of potassium should be given every three or four hours in half a bottle of soda water, or in an effervescing draught of citrate of ammonium, and continued steadily until its object is attained. If the patient be robust and if the urine be loaded with lithates, ten

minims of colchicum wine should be added to each draught.

Alkaline lotions are also applied to the joints. Half an ounce of carbonate of sodium and six drachms of liquid extract of opium are put into nine ounces of hot water. Flannels are soaked in this and applied to the painful joints and covered with gutta percha tissue.

In CHRONIC RHEUMATISM the treatment is essentially tonic, and if possible a residence should be selected in a dry warm climate. In many cases the salicylate of sodium in 20-grain doses thrice daily has an excellent effect. If no good be effected by its use in three or four days it should be discontinued and other remedies must be employed, as iodide of potassium, combined with the external application of turpentine, or if the pain be severe with hypodermic injections of morphine. In very chronic forms accompanied by great debility Mistura Guaiaci has long had a deserved reputation ; or pulv. guaiaci with iodide of potassium and tinct. colchici (F. 6*a*). If circumstances admit, and if there should be effusion, concentrated brine springs, rich in solid matter, are useful, as Aix-la-Chapelle, Aix-les-Bains, and Wiesbaden, Woodhall, and Droitwich ; while, if the pain is great, the more indifferent waters containing less saline matter are efficacious, as Wildbad, Bath, Buxton.

In lumbago and pleurodynia warm fomentations give relief, after the seat of pain has been rubbed with a chloroform and belladonna liniment (F. 57*h*). If the urine is scanty and acid, give full doses of citrate of potassium at short intervals.

GOUT

Sydenham, the father of English medicine, who was a martyr to gout, thus congratulates himself on the fact :—

"So have lived, and so have died, great kings, and leaders of armies and fleets, philosophers, and men of

varied culture, of this peculiar disease. It kills more rich men than poor, more wise than simple."

Gout was formerly considered to be a catarrh, and derived its name from the French *goutte*, Latin *gutta*, a drop, because it was supposed to be produced by a liquid which was distilled drop by drop into the diseased part. It is now deemed a specific inflammation, attacking by preference those who live well, and especially those who are predisposed to it. It is not unknown in London hospitals, as boatmen, butchers, and footmen are admitted with it. In Scotch infirmaries it is never seen.

It rarely attacks women. It is hereditary, and the result of high living and eating too much, especially when the mode of life is sedentary. It is specially induced by port wine, strong ale and porter, and rich food; and is rarely due to drinking gin or whisky.

Its special seat is the great toe, but it has also been observed in the heel, the calf of the leg, the ankle, knee, wrist, thumb, and fingers.

Symptoms.—An attack of gout is said to come on most frequently towards the close of January or beginning of February. For some days the patient feels ill, and out of sorts, with faulty and imperfect digestion, flatulency, and heaviness. The temper is peevish and irritable. With or without these preliminary dyspeptic symptoms the patient may go to bed at the usual hour, and awake to find himself suffering from the most severe and excruciating pain in the ball of the big toe, which is said to be similar "to dogs gnawing at a bone from which they have already eaten all that could be got." Even the weight of the bed-clothes is oppressive, and no change of posture gives relief. After some hours the pain may abate, and the patient falls asleep; but on awakening he finds the joint inflamed and swollen. There are also fever and furred tongue, with greater irritability and depression. The urine is high-coloured, acid, of high specific gravity, deficient in quantity, and what is passed deposits on cooling urates and uric acid.

The pain continues, with paroxysms of acuteness, for

two or three days, in a first and an acute seizure; in other cases, and when the attack is not primary, it may last as many months.

After the paroxysms have subsided the urine is usually copious, with increase of uric acid, which, with phosphoric acid, is at first insufficiently eliminated.

A violent itching of the toe sometimes precedes the outburst of gout; or it may attack the toe when the gout is disappearing, this being followed by decrease of the swelling and desquamation of the cuticle.

Gout at times attacks internal organs, and then it is best termed Retrocedent Gout. A French author says—"Articular gout is a disease, internal gout is death." It may thus retrocede to the stomach, giving rise to vomiting, internal pain, spasm; or to the heart, leading to disturbed action, small feeble pulse, or coma; or to the brain, causing severe headache, sluggishness, apoplexy, or paralysis; or to the lungs, originating a form of asthma, with severe cough.

Professor Gairdner has alluded to what is termed a "gouty diathesis." By this is meant a habit of body, in which, without gout showing itself externally, flying pains are prevalent over the body, which are sometimes considered neuralgic, and treated accordingly; whereas they are of a gouty nature, and are not benefited by the usual antineuralgic remedies.

The *chemistry* and *pathology* of gout centre round the properties of uric acid and the urates. Gouty concretions are composed of sodium biurate, and the blood and morbid effusions of gouty persons are abnormally impregnated with uric acid. According to Sir W. Roberts, in the normal state the uric acid which circulates in the blood is in the form of quadrurate. It is removed unchanged by the kidney, and with such speed and completeness as to prevent any undue detention or any accumulation of it in the blood. But in the gouty state the quadrurate lingers unduly in the blood and accumulates therein. The detained quadrurate, circulating in a medium which is rich in sodium carbonate, gradually takes up an addi-

tional atom of a base, and is thereby transformed into sodium biurate. This transformation alters the physiological problem. The uric acid, or rather a portion of it, circulates no longer in the highly soluble and easily secreted quadrurate, but as a biurate which is almost insoluble in the blood serum, and is, moreover, probably for that reason, difficult of removal by the kidneys. Under these new conditions, sodium biurate accumulates more and more in the blood, and when the accumulation has reached a certain point, is precipitated in the crystalline form in the joints and elsewhere, thereby determining the occurrence of a "fit of the gout." When the attack is over, some years may elapse before a second occurs, but on account of errors of diet and failure of the kidneys to eliminate the materies morbi other seizures occur. The intervals between the attacks are shorter and shorter, and the patient becomes a martyr to gout, which is not now confined to one joint, but invades fingers and feet, external ear, eyelids, and nose. So chronic gout, with interludes of sharp attacks, is the condition established. Deposits of the biurate of sodium of a chalky consistence called "tophi" are formed round joints, and occasionally the joints are distorted, and sometimes ulceration occurs with discharge of the concretions. The same salt also invades the kidneys, being deposited first within the tubules and subsequently in the intertubular tissue, which leads to induration and contraction, and constitutes the gouty or cirrhotic kidney. If this contracted kidney follows upon gout, a section of it shows fine white streaks running in the course of the straight tubes in the pyramids, and these white streaks have been shown to consist of prismatic crystals of the biurate of sodium. The cirrhotic kidney dependent upon other factors than gout does not show this deposit.

Sir A. Garrod has pointed out a curious connection between gout and chronic lead poisoning, and has stated that in his hospital about 30 per cent of the gouty patients from their occupations had been subject to the influence of lead. Their habits had not been intemperate,

and the supposition is that persons who are already gouty are more susceptible than others to be injuriously affected by lead. This supposition is strengthened by the fact that persons of a gouty habit or who have already had a severe attack of gout are liable from medicinal doses of the acetate of lead to have in a short time colic or a blue line upon the gums.

Diagnosis.—Gout is allied in some measure to rheumatism in its symptoms and pathology, yet differs materially from it. Gout attacks either one joint or the small joints, and usually occurs after thirty as the result of hereditary taint or high living. It is associated at first with a vivid redness, and afterwards with the formation of chalk stones; while rheumatism invades the larger joints, produces fluctuation there, occurs at any age, and is accompanied by fever and a peculiar sour-smelling sweat. Finally, rheumatism is a disease of the poor, gout of the rich, or of those who are able to afford the luxuries of the wealthy.

In gout, before and during the fit, the urates are deficient, though they become excessive afterwards; while in rheumatism the urates are always abundant.

Treatment.—Proper diet is an essential factor in the treatment of gout. All articles of food which tend to produce the materies morbi—uric acid—should be forbidden. The food should consist mainly of lean meat, fish, soup, green vegetables, a small amount of milk, bread, and eggs; and no more should be taken than what will satisfy hunger at any meal. Fruit in small quantities is permissible. Claret, hock, and whisky may be taken, but port, sherry, champagne, porter, and ale are interdicted. Exercise, as by gymnastics or walking, is essential to promote tissue metamorphosis, and for the same reason muriated saline or alkaline waters are beneficial. Hence the well-deserved reputation of Homburg and Kissingen, Carlsbad and Vichy. The salts of lithium also specially promote the elimination of uric acid, and hence the natural waters of the Crown Spring in Obersalzbrunn and Salzschlirf are recommended, or an effervescing

mixture twice or thrice daily containing two or three grains of carbonate of lithium.

When an acute attack comes on the indications of treatment are *local* and *general*. The part affected should be wrapped in flannel, cotton-wool, or oil-silk, or gutta-percha sheeting. Some prefer to apply a poultice sprinkled with tincture of opium or belladonna, and after slight friction to bandage when the inflammation has subsided. Dangerous results have followed the use of leeches or cold applications. After the bowels have been freely opened by calomel and jalap, or by Sir Charles Scudamore's draught, which contains colchicum, carb. magnesia, and sulphate of magnesium (F. 68), colchicum should be administered as follows :—

1*st*, Give it in the form of the tincture or wine in 30-minim doses with carbonate of magnesium. The quantity taken of the wine or tincture should never exceed 120 minims in the twenty-four hours.

2*d*, Suspend the medicine immediately if it causes more than four stools in the day.

3*d*, Remember that while it averts a paroxysm, it also seems in time to lose its influence to do this ; so that a patient who trusts to it and neglects proper diet, will ultimately pay dearly for his temporary immunity by a terribly severe and uncontrollable attack of the disease.

Antispasmodics, as ether or camphor, with sinapisms and friction, are beneficial in irregular or retrocedent gout ; and if the stomach or heart is affected alcoholic stimulants must be given. In chronic gout small doses of the tincture or wine of colchicum often afford great relief. Guaiacum, iodide of potassium, and the preparations of cinchona are in certain cases also useful. If circumstances permit and the journey can be easily undertaken, the waters of Wiesbaden, Teplitz, Carlsbad, and Homburg are markedly efficacious ; and in our own country Bath and Buxton can be recommended for their baths.

CANCER (*cancer*, a crab)

Cancer consists partly of cells of an epithelial origin and partly of connective tissue. The connective tissue forms alveolar spaces, which vary in structure from a loose fibro-cellular material to strong and dense fibrous tissue. The alveolar spaces are never separated from one another by stroma of any kind, but, on the contrary, communicate with each other and contain epithelial cells. These cells vary in size and shape and arrangement, but they are always separable from the connective tissue.

Cancers never originate except in connection with epithelial or epidermic structures in the skin, mucous membranes, and secreting glands.

Cancers do not remain fixed to their original sites, but tend to spread through lymphatic glands, which collect their supply of lymph from the original tumour. They increase in size by invading surrounding tissues. They are enveloped by no capsule, and they tend to implicate the skin and cause ulceration.

Cancers vary in type and malignancy, and they are subdivided into

1. Hard cancer or scirrhus. } Glandular type.
2. Soft cancer or encephaloid. }
3. Lobular epithelioma. } Epithelial and epidermic type.
4. Cylindrical epithelioma. }
5. Colloid. }

Scirrhus, the first variety, is hard—harder even than any other tumour occurring in the body, except bony, and this hardness depends upon the large proportion which the alveolar stroma bears to the contained cells. It is most common in the female breast, but it also occurs in the stomach, uterus, tongue, œsophagus, and other structures. There is heard a creaking sound when scirrhous cancer is cut with a knife, and the cut surfaces are at once hollowed in the centre. These hollowed centres are very hard, and

of a glistening white colour. There is no sharp defining edge to the growth, and between the centre and the edge the greater part of the tumour is of a pinkish yellow colour—pink and soft externally, yellow and hard internally. The surface yields a milky juice.

Encephaloid, or soft cancer, is so termed from its brain-like appearance. It is softer than scirrhus, grows more rapidly, and attacks more internal organs. It affects chiefly as a primary growth the salivary and mammary glands, testicles, ovaries, thyroid body, and the mucous membrane of the nose, liver, and stomach. It is more common in youth than age. The cells are larger than those seen in scirrhus. They are contained in greater spaces, and the stroma is relatively more delicate and small. It is by far the most malignant form of cancer, and increases with alarming rapidity, and generates the general cachexia of cancer in a short time.

Lobular Epithelioma.—Lobular epithelioma, epithelial cancer, or cancroid, develops in connection with the skin and mucous membrane, and its sites are near the natural orifices of the mucous tracts, *e.g.* mouth, tongue, anus, penis, or vulva, sometimes in the scrotum (chimney-sweep's cancer), and the upper end of the œsophagus. It originates like a pimple, which breaks down and forms a sore. Fully developed, it is seen as a ragged, irregular-edged ulcer, having an extensive, hard, and nodular base. Pain is a prominent feature, and the lymphatic glands near it are enlarged.

Epithelioma seems to have a local origin, and if detected and excised it may not recur for a length of time. If it does recur its appearance will be detected by the lymphatic glands in the same region enlarging, and the scar of the cicatrix becoming inflamed.

Cylindrical Epithelioma.—Cylindrical epithelioma is especially the cancer of the alimentary mucous membrane, but it may also occur in the bladder or elsewhere.

It forms a prominent tumour in the interior of a viscus, and may reach an enormous size.

A section to the naked eye appears generally whitish and granular, this appearance being due to the tubules of which it is made; for a microscopical examination reveals irregular tubules, with columnar epithelium in one or more layers.

COLLOID.—Colloid or alveolar cancer is jelly-like in appearance, and it is doubtful whether it originates as a distinct type of cancer, or whether it results from the degeneration of one of the types of cancer previously described. It is found most frequently in the abdominal viscera and peritoneum. Its malignancy is great, and it spreads rapidly to adjacent tissues, and causes death most frequently by interference with the functions of the organs attacked.

To the naked eye, colloid cancer looks like a mass of semi-transparent jelly, through which delicate white bands are observed. These bands under the microscope are seen to be actually fibrous. The contained jelly is arranged in concentric laminæ, between which are minute granules, and in the centre of them is a granular mass, probably the remains of altered cells.

Treatment.—The treatment of cancer is considered when speaking of the different organs of the body it attacks, as the liver, peritoneum, etc.

TUBERCULOSIS

By tuberculosis we understand a disease which is characterised anatomically by the formation of those small nodular lesions known as "tubercles." The distribution of the lesions may be more or less general as in acute general tuberculosis, or they may be limited to small areas, *e.g.* synovial membranes of a joint or pleura, or apex of the lung.

The widespread nature of diseases dependent on

tubercle is evidenced by statistics which show that in some towns twenty-five per cent of the death-rate is due to tubercular disease, and that all over the world it is the cause of the direct mortality of one-seventh of the classified forms of disease. Tubercular disease has always been a subject of deep interest to the profession and the laity, and we shall now attempt to describe briefly the opinions held with regard to it by leading scientific physicians of the present and the past.

Lænnec in 1819 stated "that the existence of tubercles in the lungs is the cause and constitutes the true anatomical character of consumption," and this conception of Lænnec is truer to the nature of the disease than Niemeyer's view, when he affirmed in 1867 that in the majority of cases tubercles, if found in the lungs after death, "have been of recent origin, and have complicated the disease when it was in an advanced stage." Much misconception existed with regard to the gray semi-transparent granules, varying in size from a millet-seed to that of a hemp-seed, being different from the yellow cheesy masses which Lænnec denominated "crude or immature tubercle." This misconception has now been removed, for it is conceded that the yellow tubercle is only an advanced development of the gray tubercle. Miliary tubercles are at present recognised as being of three kinds :—

1. Soft gray granulations, always of recent formation and essentially transitory in their characters.

2. Yellow granulations, of either recent or old formation, tending, if they undergo further change, to soften or liquefy.

3. Hard gray granulations, always chronic, and liable to no change except pigmentation.

The yellow tubercles are larger and softer than the gray. In some cases the yellow tubercles, whose origins are near to one another, blend together and form masses as large as a cherry or a walnut. In addition to the size the chief distinction between the gray and the yellow tubercle is the fatty central degeneration of the latter.

Seats.—The mucous membranes and the serous membranes are most commonly affected with tubercle. They are also observed in the pia mater. As regards organs, tubercles chiefly attack lymphatic glands, lungs, liver, spleen, kidneys, and skin and bone. They are rarely seen in the heart, salivary glands, pancreas, mamma, ovaries, thyroid gland, or voluntary muscles.

Age.—While no age is exempt from tubercles, yet they most often occur in childhood and early adult life.

Histology.—Under the microscope the following elements, *as a rule*, are seen: centrally, one or more *giant cells*, multi-nucleated, or some granular debris surrounded by giant cells; outside of the *giant cells* usually, but not invariably, are *epithelioid cells*, large with big nuclei and granular protoplasm; and outside these again there is a zone of *lymphoid* elements or cells, having no definite internal or external limit. The lymphoid elements are usually contained in a fine network of a homogeneous or more or less fibrillated *reticulum*. This *reticulum* in slowly developed lesions in some cases is well marked, in others less prominent, and in others again is wanting. The giant cell or cells in many cases send off processes which join together and form an open network in which the epithelioid cells lie. These elements, seen under the microscope, have nothing specific about them. While they may be observed in any chronic inflammation, yet they are more common in tubercle, and this is accounted for by the fact that tubercle is non-vascular; the only approach to vascularity in tubercle being when it surrounds arteries or veins without closing them. A non-vascular tubercle nodule is not by the microscope distinguished from the products of some local chronic inflammations—as carcinoma, lympho-sarcoma, and small fibroma. The diagnosis of the tubercle nodule from the nodules observed in the structures mentioned rests upon the discovery of more definite lesions in the same body, and on the clinical history of the cases.

Lænnec divided tubercular lesions into the *nodular* and the *infiltrating*. In the latter case a diffuse inflammation

is found, and microscopic examination reveals numerous non-vascular collections of cells, not aggregated into visible nodules, but separated by ordinary round-celled infiltration. *Infiltrated tubercle* in the lungs corresponds to Lænnec's gelatiniform and gray infiltration. In the liver the tubercular infiltration runs along the capsule of Glisson between the lobuli. In the cortex of the kidney it appears as streaks between the bundles of tubuli or as ill-defined rounded patches.

The Sources of the Cells.—Much dispute has arisen with regard to the sources of the cells. Most probably they are not the result of hyperplastic processes among connective tissues, but they are white corpuscles of the blood, or develop from them. The white corpuscles, according to Schüppel, coalesce in the interior of capillary vessels, and Dr. Klein states that they may be produced by the fusion together of epithelial cells, of which the nuclei persist. Either of these views destroys the idea entertained by some who consider the giant cells essential and characteristic evidences of tubercle.

Secondary Changes.—In a healthy person inflammation, as a rule, runs its course so as to leave no debris behind it, but in tubercle there is retrograde metamorphosis and a tendency to caseate. This degeneration in tubercular lesions is doubtless due to the absence of blood-vessels in tubercles. The change commences in the centre of a nodule, which becomes opaque and yellowish in a rapid or gradual manner, and the change is most marked when the lesions are large and diffused. The further process of softening and liquefaction by which vomicæ are formed appears to be essentially of a chemical nature.

Fibroid Transformation.—Tubercles may, instead of caseating, undergo fibroid transformation. The reticulated stroma is converted into a transparent homogeneous, fibrillated material, and the tubercle nodule or nodules remain as a firm fibroid mass. This transformation of a tubercle infiltration is the origin of the affection which is known as fibroid phthisis.

Recovery.—This may take place by means of the

fibroid transformation mentioned, or by the healing of the tubercular ulcer.

Bacillus Tuberculosis.—In 1882 Koch announced his discovery of a specific bacillus, as the one and only cause of Tuberculosis, and that without its influence Tuberculosis could not originate. Since then a great many experimenters have examined the question, and their results confirm the truth of Koch's original statement. The bacilli are about $\frac{1}{4}$ to $\frac{1}{2}$ of the diameter of a red



Fig. 6.

Tubercle Bacilli from the Sputum.

blood corpuscle, have rounded ends, and are *usually slightly bent.* For the most part they occur singly, or united in short threads, or heaped together in thick masses. They have no power of locomotion. For favourable growth they require a nidus closely resembling the body, such as blood serum, and a temperature maintained for about two or three weeks at about 37·5° C. They cease to grow at temperatures below 28° C., and above 42° C.

A pure cultivation may be introduced into a susceptible animal by subcutaneous injection, or into the anterior chamber of the eye, or into the peritoneal cavity, or into a vein, or by inhalation; and in from two to four weeks the disease makes its appearance, the tubercles being generally most numerous near the place of inoculation. If, however, the bacilli have been introduced directly into

the blood, a general miliary tuberculosis ensues. That the bacilli do not lose their virulence when cultivated outside the body is shown by the fact that Koch can as certainly bring about Tuberculosis with a cultivation which is the eightieth in an uninterrupted series of generations of pure cultivations as with bacilli taken directly from a tuberculous animal.

The bacilli may be found in all the tissues and organs of the body, but they are most numerous in the lung, brain, liver, and spleen. They multiply by the formation of spores, whose vitality has been found uninjured by drying for 184 days. Probably infection occurs most frequently through the instrumentality of spores given off in the sputum. This, drying, is converted into dust, which, floating in the air, is inhaled during the respiration, and so the spores find a lodgment in the lung. Koch mentions the interesting fact that "out of many hundreds of guinea-pigs and rabbits bought for purposes of research, upon which autopsies were performed after the desired experiments had been carried out, there was not a single animal which was tubercular. It was not until attempts at infection by means of tubercular substances had been made, and a large number of tubercular animals placed in separate cages, but in the same room with other animals used for scientific purposes, that solitary symptoms of tuberculosis arose in the latter." (Watson Cheyne.)

Certain general symptoms indicate tubercle, and have always been regarded as evidences of the tubercular taint. These are a delicate white skin, which at times blushes with a rosy hue of characteristic beauty; a coldness of the body; in youth great precocity both in walking and talking; with a somewhat swollen abdomen and a strong disinclination for all fatty food. When the tubercles are forming, or have actually formed, we find marked debility, loss of flesh, and fever of a remittent character, as indicated by the rise of the thermometer in the evening and a fall in the morning, which fall in advanced cases is accompanied by colliquative sweating. If the doctrine

of Koch is accepted, we cannot regard Scrofula as a special variety of any disease. The scrofulous diathesis cannot be considered to be distinct from the tuberculous, for by far the greater number of cases of well-marked scrofula are examples of tuberculosis. Into both the typical bacillus of Koch enters, and stamps the unity of the disease. Thus tubercular bacilli have been demonstrated in scrofulous diseases of the bones and joints, and the scrofulous child does not suffer eventually, as older writers stated, from tubercular disease of the lungs, intestine, or brain; for, in fact, such a child is already tuberculous. Paget's dictum no longer holds, "that the scrofulous constitution is peculiarly liable to tuberculous disease." Looking at these inferences in their practical aspects, we may simply say that a scrofulous person presents a coarser expression of the type we have described as tubercular. The lymphatic glands of the neck are enlarged, sometimes even they suppurate; the face is not so intelligent, nor marked with the same aspect of beauty; the lips are frequently thick and swollen, the nose flattened, the forehead low, the teeth carious, and the belly much enlarged during early life. A certain vulnerability is apparent in those who possess this peculiar constitution, which may still be termed, in accordance with usage, "scrofulous." A blow or injury inflicted on a healthy person may lead to inflammation, followed by suppuration, which ends by satisfactory healing and cicatrisation—a blow to a scrofulous person means far more than this. It leads to local inflammation at the seat of the injury, but it does not stop there, for it may, and often does, spread and attack glands, the inflammation in which is characterised by slow induration, by no suppuration, but by the inflammatory products undergoing the cheesy change. Whether this change occurs or not, it is to be remembered that a scrofulous exudation differs histologically from an ordinary inflammatory exudation in a healthy person. For the cells are larger than those of the genuine exudation, and have also a larger nucleus, single or double. The exudation, moreover, is diffused and the infiltration marked

by no particular shape. Thus the scrofulous constitution, clinically speaking, changes the type of various diseases, and for the worse; for they become more intractable to treatment. Scrofulous eczema and impetigo may linger for a very prolonged period, and on mucous membranes scrofulous inflammation imprints peculiar characters, as seen in ophthalmia, bronchitis, laryngitis, cystitis, and pyelitis. Further, the inflammation may extend, joints may be involved, and scrofulous arthritis, osteitis, and periostitis result.

Treatment.—Prophylactic measures are necessary to prevent the transmission of tubercular disease. 1*st*, Marriage should be well assorted, and should not, if preventable, be contracted by those labouring under this diathesis; 2*d*, If marriage has, however, been contracted, such children as are born when there is evidence of this diathesis on the part of one or other of the parents should be entrusted to a healthy wet nurse, and be much in the open air both during and after lactation. After lactation, if circumstances permit, these children should be sent to a dry and equable climate until the constitution is well developed. They will thus be enabled to spend much time out of doors without risk of catching cold, and thus obtain the most important hygienic factor—daily exercise in a pure atmosphere. On the same principle, when the child has become a young person, a timely sea-voyage is of great benefit. The appetite and digestion are thus improved, the constitution is hardened, and the general health benefited. For those who cannot obtain such changes, we must trust to cod-liver oil given in two or three tablespoonfuls daily; and to salt baths, conveniently made from Tidman's sea-salt. If the glands of the neck are enlarged, iodoform collodium may be applied, or the overlying skin touched with tincture of iodine, while syrup of the iodide of iron and cod-liver oil are taken internally. Opening of abscesses and extirpation of glands belong to surgical more than medical practice. Brine baths, as at Kreuznach, Kösen, Reichenhall, and Münster am Stein, have in such affections a deserved reputation.

Koch's new method of the treatment of tuberculosis consists in employing a remedy containing a *glycerine extract* of pure cultivations of *tubercle bacilli*. This is called *Tuberculin*. The active principle in it appears to be a derivative of albuminous bodies, and to be in close relation to them. The quantity of the active principle contained in the fluid submitted to the profession is 1 per cent. This 1 per cent solution has to be diluted 100 times before we use it, and of this diluted solution the dose is 1 milligramme.

The means of diluting Tuberculin is rather difficult, and fortunately it can now be obtained as Injectio Tuberculini Kochi direct from Berlin, properly diluted and ready for use in doses of varying strengths, as 1 milligramme, 2 milligrammes, 3 milligrammes, and upwards to 1 centigramme, and from 1 centigramme and upwards, increasing by 1 centigramme to 1 decigramme, each tube being clearly labelled with its strength.

The syringe (Koch's) should be carefully examined as to its capacity, and should be thoroughly cleaned (with absolute alcohol) before and after each injection.

The loose skin between the shoulder-blades affords the best site for the injection.

A few days before the treatment is begun accurate observations of the temperature should be taken in the morning, at mid-day, and in the evening. A careful physical examination should be made of the thorax and of the larynx, and the sputum must be examined for tubercle bacilli and also the stools, if diarrhœa be present.

The injection should be done in the forenoon, and afterwards the temperature must be taken every three hours.

If, in consequence of the injection, the temperature rises above 39° C. (102·2° F.) the following dose ought not to be increased, but the same dose employed, until the temperature no longer exceeds 38° C. (100·4° F.) If a higher temperature be maintained for some time, the next injection should not be made until it has fallen to 38° C.

In a doubtful case, when the injection is made for the

purpose of diagnosis and in early tubercular manifestations of unilateral apical catarrh of a lung, or of tuberculosis of a joint, or lupus of a restricted area, a dose of 0·005 cc. can be given to begin with, and if no reaction be produced, this dose may be increased to 0·01 cc. and then to 0·02 cc.

Precautions.—It is inadvisable to try this remedy in advanced pulmonary or laryngeal tuberculosis; extensive facial lupus (on account of the not unusual brain symptoms); intestinal or cerebral tuberculosis; as well as in cases complicated by heart affections or diabetes. If hæmoptysis or any other serious symptom appears the use of the remedy must be discontinued. The investigations of the sputum must be taken every week, and it is also desirable that the temperature and the weight of the patients should be determined at regular intervals.

Action in tuberculous cases.—This is both local and general.

The general reaction consists of a rise in temperature, which begins in about four or five hours, reaching its height in about nine hours, and then gradually passing off, lasting about twelve to fifteen hours altogether. The rise of temperature is three or five degrees above the normal. This rise is accompanied by pain in the limbs, increased cough, a sense of weakness, nausea or vomiting, cardiac excitement with marked increase of the pulse, which may reach 120 or 140 beats in the minute.

The *local reaction* is best observed in lupus. A few hours after the injection the lupus spots begin to swell and redden. Around them is a bright red zone of variable extent. A yellowish red serum subsequently exudes, which quickly dries into thick yellow crusts. These fall off, after two or three weeks, leaving a clear red cicatrix behind.

Liebrich has also attempted the hypodermic injection of cantharidine of potash in doses of one deci-milligramme, and some observers have confirmed his statements as to its advantages. The great danger from this method is obviously renal and vesical irritation, and thus the

urine should be carefully tested for albumen, and if it be detected, the injection should be modified or completely abandoned.

The rapid rush for cure in the treatment of tuberculosis is to be deprecated. The methods mentioned judiciously used may prove valuable additions to the resources of the medical practitioner, but they do not supplant in any degree the teachings of old experience. Every remedy that was useful before will be useful still, for all that is new is not true, and all that is true is not new.

RICKETS

Rickets is a disorder of nutrition peculiar to childhood. This disordered nutrition leads to overgrowth, with deficient calcification of the tissues destined to form bone, and hence the growth of the skeleton is interfered with, and transient or permanent deformity occasioned of some of its constituent parts.

The etiology of rickets has excited much controversy, and evoked many theories. It is acknowledged to be a disease of the poor more than the rich, and especially the poor of large towns. The period for its first appearance in the majority of cases, as shown by statistics, is during the first dentition from the sixth to the thirtieth months. It seems to affect the sexes in equal proportions, and in some cases is inherited, especially from the mother. Improper feeding, authorities unanimously state, takes the foremost place as an exciting cause, and some have supposed that keeping the child too long at the breast has been the chief factor in its production, while others affirmed it to be too early weaning. Probably both views are to a certain extent correct, for too long suckling gives insufficient nourishment, while too early weaning and the substitution of unsuitable food will prove prejudicial to the child's development and growth.

Wagner's views as to the production of rickets appear sensible and practical, and present a chemico-philosophical

explanation of the problem. There is, he states, an irritation of the bone-forming tissue, and it is found that phosphorus adds to the irritation if lime is withdrawn from the food, for rickets can be produced in this way experimentally. Lactic acid has a similar effect to phosphorus as an irritant to the bone-forming tissue, and lactic acid in excess is found in the system of rickety children. The irritant accordingly exists in the lactic acid, and the other condition to the production of rickets, deficiency of lime, is afforded whenever the mother's milk, by prolonged suckling or weakness, becomes poor in earthy salts, or whenever the digestive derangements of the child cause these salts to be excreted more abundantly than usual, as, for example, by diarrhœa. Thus, then, by improper feeding too much lactic acid is produced, and consequently bone-forming irritation is occasioned. At the same time, the earthy matter is reduced either directly, as in cases of prolonged suckling, or indirectly, as when diarrhœa carries off the lime salts from the intestines before they are absorbed. The combination of these two factors causes rickets, and its origin, so far as symptoms are concerned, is insidious. The child is fretful, and the bowels are irregular. It cries when its limbs are firmly grasped. There may be restlessness or fever at night and morning. With this restlessness and sensitiveness of all parts of the body to even gentle pressure, there is another characteristic, namely, profuse perspirations over the head and neck and chest of the child during sleep.

These symptoms may have been noted some time before the peculiar changes in the bones commence. The articular ends of the long bones swell and protrude under the soft parts, more particularly on the hands, feet, elbows, and knees. In the skull, the disease shows itself by non-closing of the fontanelles and sutures. If the child is young, the teeth do not come forward—if older, they may rot and drop out. Through the force applied to the bones by the muscles attached to them, and by the weight of the body, they become further deformed and

bent, usually in an outward curve. The ribs also are depressed laterally, and cause the breast-bone to stick out like the keel of a boat. There is also often spinal curvature. Naturally, the increase of the body is delayed. The child cannot walk; or if it could walk before, it loses the power to do so. In mild cases the disease does not advance far. The morbid process is checked, and results in recovery, with, however, more or less striking deformity. In severe cases the diarrhœa increases, the weakness is extreme, and the child dies with the symptoms of marasmus and hectic fever. The younger the child the greater the danger. The deformities of the skeleton may entirely disappear, and of those that remain two only may be troublesome in after-life—the pigeon breast in both sexes, and the distorted pelvis in the female.

Treatment.—Hygienic rules must be carefully enforced. The earliest possible symptom of rickets should be watched, and if detected the extension of the disease may be prevented. The mother's milk must be carefully attended to. As a rule, this is sufficient until the sixth or seventh month without any auxiliary aid, but after that time it should be supplemented, and how? By the use of cow's milk, sweetened and diluted according to the age of the child. Next to cow's milk are Nestle's food and Revalenta Arabica, the main constituent of which is finely powdered lentil meal. The child should not be suckled after it is ten months old. At nights it should have a tepid bath in which there is some of Tidman's sea-salt. Sea air in summer is very essential, and effects in many cases marked improvement. During the day the child should be carefully protected from cold and much in the open air. Lime water should be given several times a day—a teaspoonful either in the milk or by itself. If the digestion is fairly good, some light preparation of iron may also be used, and cod-liver oil is essential in winter—the doses increasing from a teaspoonful to a tablespoonful twice daily. Syr. ferri phosph. should be added to the cod-liver oil, and if there should be a tendency to

diarrhœa, both remedies should be replaced by hypophosphite of lime (F. 82, or F. 82*a*).

The deformities of the limbs, it may be remembered, tend to disappear as the child grows older; but, if not removed, the necessary remedies belong to the domain of surgery.

CRETINISM (*creta*, chalk)

Cretinism may be defined to be a condition dependent upon endemic causes, and characterised by incapacity of mind and deformity of body. It is observed in the valleys near to large mountain chains, where there are few atmospheric changes, and where magnesian limestone is present in excess in the soil through which the water permeates. On the continent it is seen in Switzerland, Savoy, Piedmont, and the Pyrenees. In England it has been noted in the dales of Lancashire and Yorkshire. The physique of a typical cretin is remarkable. In stature he is rarely more than 5 feet. His skin is thickened or wrinkled, yellowish tawny in colour, and looks too large for his body. The expression of the face is stupid, the tongue large and thick, often protruding from the mouth, which is margined by thick lips, and with saliva generally dribbling from it. The abdomen is, from looseness of the skin, pendulous, and the legs are short and deformed. The cranium is hydrocephalic, from the delayed ossification of the fontanelles and sutures. The intellectual faculties are imperfectly developed, and the cretin is often unable to speak, and rarely can hear. Cretins are generally impotent, and few live beyond thirty years.

Cretinism and goître seem to depend on the same causes, for there is no district in the world known "in which endemic cretinism occurs and in which goître does not likewise prevail. Again it has been noticed that when a family migrates into a place where the two diseases are met with, goître is first developed in them; and it is only in the second or third generation that cretins present

themselves." "Sporadic cretinism" is not peculiar to one part of a country, and in the great majority of cases the THYROID GLAND IS ENTIRELY ABSENT, but in almost every other respect, as regards physique or intelligence, the two forms of cretinism are identical. A peculiar, movable, FATTY tumour in the "posterior triangle" outside the sterno-mastoid muscle has been shown to exist in sporadic cretinism.

Treatment is prophylactic. The diet should be nutritious, and cod-liver oil with syrup of the phosphates must be given liberally. Cleanliness is essential, and physical exercise of the muscles ought to be encouraged. If possible, removal should be effected to a district where the soil is porous and dry, and where goître or cretinism is unknown.

MYXŒDEMA (*μύξα*, mucus; *οἴδημα*, swelling)

This disease is characterised by a jelly-like mucus causing dropsy, unaccompanied by albuminuria or sign of primary renal disease.

Symptoms and Course.—Adult females (more rarely men) when suffering from myxœdema present, especially on the face, pathognomonic symptoms. This is swollen in every feature, the swelling being waxy looking; and, as proving its non-renal origin, it affects equally dependent and non-dependent features. The swelling does *not* pit on pressure, and there is a defined scarlet flush of cheek and nose, which markedly brings out the waxy pallor round the eyes and mouth. The loose, baggy, almost translucent lids, the dry brawny cheeks, the thick blubber lips, the swollen red (spadelike) hands, and deliberate speech and volition, constitute a group of symptoms which can hardly be mistaken for any other disease.

The conditions, moreover, noticed in the face are seen, on more minute examination, to invade all parts of the body, for the skin is everywhere thickened, translucent, dry, and rough to the touch, with absence of perspira-

tion. The general symptoms, apart from those mentioned, indicate gradual decay, physical and mental. The body and mind become unwieldy. The movements of the limbs are languid, the maintenance of fixed attitudes difficult, and falls are not uncommon. Thought and volition lag. Ideas come gradually and are tardily expressed, yet the language is correct. Though the handwriting is little changed, still the act is performed with hesitation and apparently by concentrated attention. Ultimately the memory fails.

The temperature is persistently subnormal, ranging between 98° and 94° F. The debility increases, but not rapidly, and the prognosis is unfavourable to recovery; and death, after a course of six years or more, is ushered in either by coma or uræmia, or results from inanition.

The *pathology* of myxœdema may be said as yet not to be clearly understood, as cases are rare; but medical opinion seems at present to show that there is an intimate connection between the disease and the thyroid gland. In cases recorded of the disease in an advanced stage there is atrophy of this gland, and it would appear that when the gland has been removed by surgical operation for goître, progressive symptoms set in, which ultimately terminate in a mixture of myxœdema and cretinism. If this extirpation is done in early life, there seems afterwards to be an arrested development of mind and body, so that a previously bright and lively child becomes a dwarfy cretin, with all the symptoms of myxœdema superadded. The conclusion of a consideration of the cases operated on by Professor Kocher of Berne for goître, read now by the myxœdemic literature of this country, shows that "the loss of function of the thyroid gland would appear to produce both cretinism and myxœdema."

Treatment.—Cases of myxœdema suggest good food, warm clothing, and the use of iron and arsenic as the basis of treatment. In addition to these it has been found that vapour baths and jaborandi, in the form of extract or by the subcutaneous injection of pilocarpinæ

nitras, may arrest the signs of myxœdema. Ten to forty minims of the extractum jaborandi may be given four times daily. Nitro-glycerine has benefited one case.

LEPROSY

There are two forms of leprosy—the anæsthetic and the tubercular—the symptoms and course of which are different.

The *anæsthetic* is ushered in by a tired feeling, followed by neuralgic pains in different parts of the body. Subsequently spots, rather difficult at first to detect, appear on the arms and face. As the disease advances they are seen to be symmetrical, brownish-red in the periphery, and in the centre white. They assume in time the size of a filbert or walnut. Anæsthesia is detected over the spots, and also on some fresh parts of the skin, and there may be also swelling of the glands. Contraction then sets in, which as a rule is permanent, and is associated with the distribution of the facial, the ulnar, and the other nerves of the extremities. Paralysis follows, and ultimately topical necrosis of the bone. The course of this form of leprosy is slow, and may extend over a number of years.

The tubercular.—In this form a symmetrical tubercular eruption appears on the face, arms, and legs, and afterwards on the trunk. After a time the tubercles soften, suppurate, and break, and the disintegrating process affects the bones. The course in the tubercular is more rapid than in the anæsthetic, and death occurs in from eight to ten years. In some cases healing of the sores occurs, and brown spots with white cicatrices mark their sites. At times, also, the lungs are affected with phthisis, and the bacillus of Koch, but not the bacillus of leprosy, is recognised.

Bacillus of Leprosy.—The nodes which are apt to form on various parts of the skin and mucous membranes in leprosy occasionally break down and ulcerate, with the

formation of an abundant thin pus. In this, or indeed in the growths of leprosy generally, large numbers of bacilli may be found. They have the form of *rods*, 4-6 μ long and 1 μ in breadth, and have a close resemblance to the bacillus of tubercle. Like the latter they stain in alkaline fluids, and are not bleached by subsequent exposure to acids. They are distinguished by the comparative readiness by which they stain, and by their more easily taking up the colouring matter from a simple watery solution of aniline dye.

The opinion of physicians at Bergen with regard to the question of contagion is that in the ordinary sense of the term the disease is not contagious. The belief is that the disease is mainly hereditary, and does not depend on any particular kind of food or on any climatic influence. It is, however, conceded that it may be contracted by a healthy person through close personal intercourse with a leper, or that it may originate from the bacillus being swallowed, or by its coming into contact with the cornea. It cannot occur from inhaling the breath of a leper.

Treatment.—In ancient times the leper was banned by the Church and boycotted by the people, and old writers tell how "a pair of clappers, a barrel, a stick, cowl, and dress were given to him. He was interdicted from appearing without his leper's garb. He was forbidden to walk in narrow paths, to answer those who spake to him, unless in a whisper, that they might not be annoyed by the pestilent breath, and by the infectious odour which exhaled from his body. The official of the Church terminated the ceremony of his separation from his fellow creatures by throwing upon the body of the poor outcast a shovelful of earth in imitation of the closure of the grave." Alone and unattended, except by his fellow-sufferers, he had to "dree his weird." The march of civilisation has altered this condition of matters. Father Damien's noble life and tragic death lent additional force to efforts that had been made in mitigating the sufferings of the lepers. The cause and prevention of the disease have been discussed in the press, and in professional and

social circles, and royalty has thrown its ægis over the proposal of a national leprosy fund. There is little probability of the disease spreading in this country, but in India it appears to increase unchecked, and the executive committee propose an inquiry there on its social as well as its medical aspects. Such an inquiry, by enlisting native sympathy in its support, must pave the way for legislative action, thorough and complete, by which the leper will be removed from the haunts of men to well-selected hospitals. For this separation is the only treatment which according to our present knowledge is of any avail. When the disease begins there is no hope for the afflicted one. No medicine seems to arrest its progress.

FRAMBŒSIA (*framboise*, a raspberry)

(*Synonym*, Yaws) is a peculiar disease, which attacks the African race in their own country and in the West Indies, and appears to be a malady epidemic and contagious. After an incubation of from three to ten weeks an eruption is observed on the face, neck, feet, and genital organs, of yellowish or reddish-yellow tubercles, which gradually develop into a moist exuding fungus without constitutional symptoms, or with such only as may result from ulceration and prolonged discharge, viz. debility and prostration. The ordinary duration of the disease is from two to four months, when it ends in recovery, but it may extend to several years, and lead to death by exhaustion. Some consider it similar to *Parangi*, endemic in Ceylon.

Treatment.—Cleanliness, a generous diet, the local use of carbolic acid, and weak citrine ointment form the essentials of treatment; sarsaparilla, iodide of potassium, and bitter tonics may be taken internally.

PURPURA

seems to be dependent on a lowered vitality, the result of liver disease, affection of the spleen, syphilis, poverty, intemperance, or over-work. This lowered vitality in some way affects the blood, breaking up the red corpuscles, and allowing their contents to transude into the tissues.

The blood thus passed through the capillaries is seen as circular spots, varying from the size of a pin's head to that of a pea, being apparent first on the legs, afterwards on the trunk. They are unaltered by pressure, and have no tendency to coalesce, unless exposed to pressure, when they seem to run into one another, causing vibices or ecchymoses. In their first or circular form they are termed petechiæ.

Purpura is usually ushered in with slight fever, and with the other usual concomitants of this, viz. thirst, headache, and quick yet compressible pulse. In other instances the premonitory symptoms may pass unnoticed. Not merely does the skin suffer as described, but blood may also transude into the several mucous, and occasionally also into the serous, membranes of the body. In these effusions lies the chief danger of purpura, and the disease has thus two great divisions :—

Purpura Simplex and Purpura Hæmorrhagica.—In *purpura simplex* the disease runs a simple course, with little constitutional disturbance. A few spots are probably found dispersed over the body on awakening in the morning, but not aggregated. Two or three successive crops may thus form ; and the disease usually subsides in from seven or eight days to a fortnight.

Purpura Hæmorrhagica is an aggravated form of the simple disorder, and in addition is specially characterised by an effusion of blood into those passages of the body lined with mucous membrane. Consequently, effusions are observed during life on the gums, tongue, and inside

of the cheek; and, if the case ends fatally, they can be seen all over the digestive tract.

Necessarily, the constitutional symptoms are more intense, the fever higher, the general oppression more apparent than in the other form; and, in from twenty-four to forty-eight hours, spots are rapidly developed on the skin. These spots are of a bright red colour at first, but deepen into a purple red. The skin becomes tender and blotched, and scratching occasions bleeding.

The same exudation may take place into the mucous membranes from the first, but it usually follows after a few days. Oozing of blood, which it is sometimes difficult or impossible to check, may occur from the gums, while from the same cause there may be epistaxis, or hæmorrhage from the lungs, stomach, or bowels. Thus there may be great and fatal loss of blood, or simply weakness, anæmia, and pallor.

Diagnosis.—Purpura and scurvy may be confounded with one another. They agree in this, that they are due to some impoverished state of the blood which leads to effusion. They differ, however, as will be observed, in certain points.

Scurvy appears gradually, purpura suddenly and with some premonitory feverishness. Scurvy is essentially characterised by sponginess and lividity of the gums, while these conditions are absent in purpura. A dusky sallow complexion accompanies scurvy, but not purpura. Further, scurvy is due mainly to the want of fresh vegetables, and can be cured by the administration of these.

No single error of diet, no single cause, originates purpura, and it can neither be prevented nor cured by the antiscorbutic remedies.

Treatment.—Ignorant of the cause, we can only treat purpura symptomatically. We have no specific, as in scurvy; yet, knowing that poverty, bad diet, fatigue, and defective ventilation, are great predisposing causes, it is obvious that a good nourishing diet, rest, and a well-ventilated room are essential.

Ten or twelve drops of dilute sulphuric acid, combined

with one grain of quinine, may be given every two hours, or F. 75. Tincture of the perchloride of iron in large doses seems specially serviceable in Purpura Hæmorrhagica.

When internal hæmorrhage occurs, the oil of turpentine, combined with creasote to prevent nausea, is necessary.

In cases of extreme anæmia there is danger of fatal swooning; hence the patient must preserve a horizontal attitude until all the prominent symptoms of anæmia disappear.

ANÆMIA. CHLOROSIS—*Synonym*, Green Sickness

A high degree of pallor on exposed parts of the body, a bloodless condition of the lips, gums, conjunctivæ, and finger-nails, are evident and significant symptoms of anæmia. We shall indicate some conditions which operate in causing these symptoms.

1. The decrease of the quantity of blood may be *direct*, *i.e.* due to some hæmorrhage from the lungs, stomach, bowels, or uterus; or it may be *indirect*, caused by deficient supply or faulty assimilation of food, as in convalescence from febrile and acute diseases, and in many chronic complaints connected with the organs of digestion. *Indirectly*, also, pallor is associated with loss of albumen in chronic kidney diseases, and with considerable effusion into the pleura, pericardium, and peritoneum.

2. Extreme pallor may be due to causes acting *temporarily* or *permanently* on the circulation. The *temporary* effect is seen in the emotional influences, as terror or anxiety, which blanch the face, and depend on a feeble action of the heart, resulting in unfilled capillaries; or when the effect, though still temporary, proceeds further, and terminates in a swoon through abrupt cessation of cardiac action. The *permanent* is evidenced when, consequent on mitral disease, the pulmonary vessels become enlarged, and thus leave the heart with less blood to propel through the system; and in consequence a pale

characteristic yellow hue spreads over the skin. The quality of the blood in anæmia is altered. It is pale and thin, and the lessened number of the red corpuscles, when counted by the hæmacytomer, show that they are 60 per cent of the normal. The blood in chlorosis is also paler than normal, but this seems due to a marked deficiency of hæmoglobin rather than of red corpuscles, for although the latter are below the normal in number, the percentage amount of hæmoglobin is almost invariably less than that of "corpuscular richness." In anæmia we have some definite cause, but chlorosis depends on many factors. The blood in chlorosis circulates in vain. It fails to nourish the frame, and great debility ensues. Vital chemistry is stricken with inertia, and the change from health is manifested by the pallid face, the bloodless lips, the palpitating heart, the listless movements, the flatulence, and the constipation. The explanation of these symptoms is this. A new apparatus has, as it were, sprung up in the female, which for fifteen years had given no signs of life. She has now attained the age of puberty; a new era in her existence has begun, a fresh centre of activity has emerged, and the uterus now claims its pabulum of support. In many females this new life is established without any crisis, any strife, or any trouble. But in others the organism rebels, the digestion is impaired, the health fails, and the result of the struggle is *chlorosis* or poverty of blood. We have described the most obvious appearances of the affection, but it may be accompanied with other and more subtle symptoms. For it is sometimes shown by nervousness, by timidity, by exhaustion; sometimes with an increase, sometimes with a decrease, of cardiac action; sometimes it is manifested by a dry skin, by thirst, by fever, by loss of appetite, by constipation or diarrhœa; sometimes it is only told by the story of irregular or arrested menstruation, or by the discharge being pale and scanty. Confirmatory evidence of the affection is afforded by the presence of abnormal sounds in the heart and great vessels. Thus, apply the stethoscope lightly to the patient's neck, just above the inner

end of the clavicle, and there is carried to the ear of the auscultator a loud, continuous, venous hum. Its tone is like a gyrating spinning-top, and was designated "bruit de diable" by Bouillaud in 1835—the "diable" being a toy known in Paris which made the same sound. An "anæmic murmur," systolic in rhythm, loudest at the base of the heart, is also heard.

PERNICIOUS ANÆMIA (Idiopathic anæmia) is a peculiar form of anæmia which affects both sexes equally between the ages of twenty-five and forty. Its origin is obscure; pregnancy and the puerperal state have been credited with its occurrence in many cases, and gastro-intestinal disturbance, privation, and mental shock in others.

Symptoms.—For weeks or months, without any obvious cause, the patient loses strength and becomes paler, but the pallor, unlike that of ordinary anæmia, is of a yellowish tint and not waxy white. There is little emaciation with the anæmia, yet the patient is breathless and disinclined for any bodily or mental exertion. A loud and persistent cardiac murmur can in some cases be detected, and the urine is usually highly coloured and free from albumen. It may contain a normal quantity of urea and uric acid as well as indican. The pupils are mostly dilated, and the retinæ show on ophthalmoscopic examination numerous small hæmorrhages which are most numerous round the optic disc. The blood corpuscles may be reduced as low as 10 per cent of the normal. A feature of this form of anæmia is the presence of fever, which may give a temperature of 101° to 103°. This fever is, however, irregular. It may be absent for days together, and the temperature is often subnormal before death. The prognosis is unfavourable. Dr. Pye Smith has collected twenty cases of recovery as compared with one hundred and three fatal cases. Of the fatal cases a large number die in about six months, others last twelve or thirteen months. The fatal termination is sometimes due to syncope, but usually it is slow and gradual, with delirium and insensibility before death.

At the post-mortem the most constant conditions ob-

served are fatty degeneration of the heart, liver, kidneys, and hæmorrhages into the serous membrane of the endocardium, the mucous membrane of the stomach, the retina, the lungs, the surface of the brain, and other parts. An abundant deposit of iron is found in the cells of the liver and the spleen.

Treatment.—In anæmia and chlorosis the bowels are usually constipated and treatment should begin with an aperient mixture as decoctum aloes co. (F. 25). After its action has been manifested iron should be prescribed. In CHLOROSIS, the preparation of iron selected is Blaud's Pill, which under the name of Pil. Ferri is now made official in the addendum to the B. P. For the derangements of digestion which exist, it is rarely necessary to give any special medicine; for these derangements are simply symptoms of the disease, and the pill should be prescribed at once in the following manner. Begin with three pills daily and continue by the addition of one pill daily, until eighteen are taken. Then decrease by one daily until the original number of three is reached.

If during their administration menstruation appears, then for this period discontinue them, but when it has ceased proceed as before. So administered this pill works admirably, the lips and gums testify to the operation of iron on the system, for they assume the colour of health and the anæmic murmur disappears. Yet although perfect health seems to have been restored it is absolutely necessary to guard against a relapse, which may occur, and accordingly the pill thrice daily should be continued for three or four months. If chlorosis has set in, before menstruation has occurred it is advisable, after the iron treatment has been fully carried out, to give a 30 m. dose of the fluid extract of ergot for two or three days or 2 grs. of permanganate of potassium twice daily. These remedies generally effect their purpose, and the menses appear. When hysteria is associated with chlorosis massage is a useful adjunct to the iron treatment, and it may be necessary also to insist on the feeding recommended by Dr. Weir Mitchell.

In OTHER FORMS OF ANÆMIA, as in recovery from acute disease or from hæmorrhage or from general debility, the tincture of the perchloride of iron is most serviceable. If derangements of digestion occur from its use, one of the scale preparations of iron should be substituted for it, or the non-official lactate in a dose of 5 to 10 grs. thrice daily, or dialysed iron with glycerine (F. 90). To correct constipation, if present, a pill of aloes and myrrh is preferable to any other form of aperient medicine; but if diarrhœa, not constipation, exists the sub-nitrate of bismuth in a 10 grain dose thrice daily, is usually sufficient to check it. For patients who are anæmic without any other complication, and who can afford to leave their homes, the chalybeate springs of Schwalbach, Spa, Pyrmont, the Luisen of Homburg, and St. Moritz can be highly recommended during the summer or autumn months. These springs contain carbonate of iron and carbonate of sodium, and the therapeutic value of this combination is enhanced by fresh air, pleasant society, and agreeable surroundings. If there be chronic intestinal catarrh with anæmia the alkaline waters of Franzensbad, Kissingen, or Tarasp prove highly useful. In PERNICIOUS ANÆMIA iron seems to have no effect, and other tonics are of little service. Arsenic is the only medicine which appears to exert a beneficial influence. Special symptoms should be met as they arise.

LEUKÆMIA.—This affection was designated Leucocythæmia by Dr. Hughes Bennett, but it is now generally termed Leukæmia. It consists essentially of a great increase of the white corpuscles of the blood; and these corpuscles, when the blood is placed under the microscope, occupy nearly the whole field in the proportion of one to ten, one to five, or one to three. Their size varies; some are large with two or three small nuclei; others are smaller with one nucleus nearly occupying the cell. On the other hand, the red corpuscles are less numerous than in health.

Ætiology.—The disease occurs in men much oftener than in women, and mostly at middle life. It is sometimes observed in young children. The cause of the

disease is obscure, and no satisfactory evidence has been furnished as to its production.

Symptoms.—One of the first signs is enlargement of the abdomen, through hypertrophy of the spleen, which may have been enlarging for some time without any constitutional sign. When an examination is made it may then be found to be a firm hard tumour occupying the whole left side of the abdomen. The liver also enlarges to the extent of two or three inches, and in some cases the lymph glands in the neck, groin, and axilla are involved, being moderately large, and not very hard. When the spleen is already very large, there may be no outward signs of anæmia, but later on the patient loses colour, and becomes sallow or very anæmic. The temperature is generally affected; there is continued pyrexia or periods of pyrexia alternated with periods of apyrexia. The altered conditions of the blood give rise to dyspnœa and hæmorrhages. The hæmorrhages take the form of epistaxis, bleeding from the gums and mouth, and purpuric spots under the skin; occasionally there is bleeding from the lungs, stomach, intestines, kidneys, or uterus. Albumen is rarely detected in the urine, but indican is often present. The disease lasts from one to two or three years, and towards the end the pallor increases with ascites and hydrothorax, and finally death occurs from intercurrent affections, as pleurisy, pneumonia, or cardiac failure from dilatation.

Treatment.—Quinine and iron do not appear to be of any use, and most reliance is to be placed on the persevering use of arsenic. The inhalation of oxygen is worthy of trial, and a case of recovery from the disease by this method has been recorded by Kirnberger.

HÆMOPHILIA

In certain families the males, during successive generations, are liable to protracted and even fatal hæmorrhages after injuries of no great severity. Such families are

termed "bleeders." Though the hereditary tendency is unquestioned, and the proportion of males to females is given as thirteen to one, yet the inheritance of the complaint takes place mainly through the female line. The sons in a family in which it exists do not always all suffer, but the daughters of such a family, even when they themselves have shown no tendency to hæmophilia, are almost certain to transmit it to their male children.

Course and Symptoms.—About the end of the first year, or at least before the second year, definite symptoms generally appear. Spots and patches of effused blood are observed, without any apparent injury. Epistaxis is the most common form of mucous hæmorrhage, especially in children. Next comes bleeding from the mouth and gums. These may be considered as spontaneous or quasi-spontaneous forms of hæmorrhage, and are in marked contrast with those which occur from blows, cuts, or even scratches, when blood may be lost to such an extent as to endanger life. The extraction of a tooth gives rise to a remarkable amount of hæmorrhage. The deeper structures may also be the seat of extravasation of blood, especially upon the thigh, where the slightest blow may fill the connective tissue with blood from the knee to the trochanter. As a rule such swellings, if not interfered with, slowly subside. *Articular implication* usually begins between the seventh to the fourteenth year, and is observed, especially in the knee-joint, as the result of a blow or following on a long walk. The enlargement often increases rapidly, and appears precisely like that which might be due to rheumatism or synovitis. The usual course of the swelling is slowly to subside under treatment, but to return again and again at intervals of months or years.

Prognosis.—By far the largest number of those affected with hæmophilia die before they are eight years old. When adult life is reached the danger is lessened, but it is by no means at an end, for a fatal bleeding may occur as late as fifty or sixty years of age. The quantity poured forth is sometimes enormous. Thus half a gallon is

stated to have been lost in the twenty-four hours from the extraction of a tooth, and it often happens that oozing may go on at the rate of three or four pints a day for several days. As the bleeding goes on the patient becomes pale, bloodless, delirious, and unconscious, and death is often preceded by convulsions.

Pathology.—Different statements are made as to the nature of hæmophilia. Dr. Legg thinks it may depend on backwardness of growth or imperfect development of the vascular system generally, and Sir William Jenner says that there is in hæmophilia "a tendency to plethora of the smaller vessels." Immermann states that the essential thing is a disproportion between the capacity of the circulating apparatus and the volume of the blood.

Treatment.—The diet should be light and stimulating, and thus "a considerable proportion of white meats" is recommended by Jenner, with an aperient dose of sulphate of sodium every week, and pil. hydrargyri every third week. Dr. Legg advises the taking of the tincture of the perchloride of iron, and residence in a warm dry climate. When actual hæmorrhage occurs, ergot or gallic acid should be given. Locally there is no styptic so valuable as the tincture of the perchloride of iron.

DIABETES

The word *diabetes*, derived from the two Greek words, *διὰ βαίνω*, literally means that the water is constantly running through the patient's system. Used in this sense, diabetes may have a wide significance, but it is now employed as representing two distinct kinds of disease. In both there is an increased flow of urine; but in the one, Diabetes Mellitus, there is glucose—commonly termed sugar—in the urine; in the other, Diabetes Insipidus, this is absent.

Diabetes Insipidus (*Synonyms*, Diuresis, Polyuria) seems to depend on unknown causes, attacking by preference the male sex, usually between the ages of five

and thirty. It has certain permanent and characteristic features, viz. an excessive flow of uncoloured urine of low sp. gr., containing neither sugar nor albumen, and attended with a dry skin and great thirst. The course of the disease is uncertain ; usually it is slow, and other affections supervening may cut off the patient. As in Diabetes Mellitus, death is ushered in sometimes with diabetic coma. The only remedies which seem rationally to do good are the ext. ergotæ liq., or preparations of opium in large doses. Other modes of treatment which have been tried are empirical, as alum, gallic acid, jaborandi, atropine, and valerian.

Diabetes Mellitus (*Synonym*, Persistent Glycosuria), although it seems to have been known in some measure to the ancient physicians, was practically unrecognised until Dr. Willis, in 1674, described it as a distinct disease ; "for in it the urine differed from all other fluids of the body, as if it had been mixed with honey or sugar, and having a powerfully sweet taste." Passing over subsequent years, it may be mentioned that Dr. M'Gregor of Glasgow in 1837 discovered sugar in the blood as well as the urine, "and that the stomach formed saccharine matter instead of healthy chyle, which entered into the blood, and instead of forming fat, bone, and muscle, was passed into the system as sugar, and thence eliminated by the kidney." Claude Bernard in 1848 opened up a new era in diabetes, when he pointed out how sugar was formed and excreted from the system. He found the blood of the hepatic vein to be rich in sugar, whilst the blood of the portal vein contained no sugar whatever, or mere traces of it ; and he further discovered sugar in the livers of animals fed entirely on meat. He concluded, therefore, that as the blood entering the liver contained no sugar, while that leaving it had it in abundance, sugar was formed in the liver under normal conditions. He subsequently discovered within the liver itself a substance closely resembling sugar in the arrangement of its elements, and readily changed into sugar under the influence of an animal ferment. This substance was Glyco-

GEN, and around it he perceived centred the formation of sugar in the liver. For the transformation of glycogen into sugar was the result of a ferment of the liver; and so the hepatic veins carried the sugar-loaded blood to the inferior vena cava, whence it reached the heart, and where again it was transferred in the usual circulatory course to the lungs to be burnt up and consumed. If this oxidation was complete, sugar was not detected in the blood or in the urine; but if it was incomplete, sugar was observed in both, and the existence of Diabetes Mellitus could be recognised in the latter by its appropriate tests. Further, he showed that by puncturing or irritating the eighth pair of nerves at their origin in the fourth ventricle, an abnormal development of sugar could be produced; and this pre-eminently favoured the idea that the whole process of sugar-formation in the liver was governed by the nervous system. Such is a brief outline of Bernard's theory, and it has formed the point of departure for many theories of diabetes since broached.

This glycogenic function of the liver, the foundation of his theory, has been assailed notably by Pavy. He found sugar in the blood of all parts of the vascular system, in the hepatic veins, and in the tissue of the liver itself if immediately removed from the living animal and examined without loss of time. He found the sugar constantly increasing up to a certain limit from the beginning of death. It was thus a post-mortem process. He considers that the hydrocarbons taken with the food are normally stored up in the liver in the form of glycogen, and this is not changed into sugar but into fat, which serves for the formation of bile. Under abnormal conditions glycogen is converted into sugar, and thus diabetes is produced.

Other theories have been advanced, but they may be said, generally speaking, to be modifications or enlargements of the views of Bernard or Pavy. And these two theories again merge into the wider question, Does diabetes proceed primarily from the nervous system, or has it its origin in the intestinal canal or the liver? Is it

neurogenic or hepatogenic? A dogmatic answer can scarcely be given. In all probability the great majority of cases of diabetes have a nervous origin, but that others proceed primarily from the digestive organs must be allowed. To enter into further details would provoke unnecessary digression in view of the plain fact that there are no constant post-mortem appearances in Diabetes Mellitus. The brain, the spinal cord, and the different internal organs have been searched, but in vain, for its cause. The liver and the kidneys, seemingly so much implicated, reveal nothing inconsistent with health. In a careful examination of nine cases in the Glasgow Royal Infirmary, Dr. Foulis found no confirmation of Dr. Dickinson's statement that there was a dilatation of the arteries of the brain followed by degeneration and excavation of the nervous substance in the neighbourhood.

The *symptoms* of diabetes are as patent as its pathology is obscure, for it may be suspected if there is thirst and an increased quantity of urine, with loss of weight, impaired physical and mental endurance, and disinclination for all sexual intercourse. The skin is dry, the tongue is hard, red, and cracked, the digestion is faulty, and the bowels constipated. Wandering and severe pains are frequently complained of in the muscles of the calf of the leg, and these pains sometimes prevent sleep. The temperature is low, there is a lack of interest in passing events, and a melancholy hopelessness as to the future.

The urine passed may rise to 15, 20, 30 pints, or more, in the course of twenty-four hours, and it presents to the eye a pale colour, while its odour is sweet, like that of new-mown hay or that detected in a chamber containing apples. There is no sediment after standing, and this and the clear colour suggested to Dr. Prout the pertinent inquiry for fixing the date of the beginning of the disease by asking the diabetic patient, "When did you last observe your urine muddy?" The effect of sugar is to increase the specific gravity, which in all cases of persistent glycosuria is above 1020, and in some instances rises to 1050. Is the existence of sugar in the urine in

all cases indicative of diabetes? The answer to this is Not always, for it may be found in certain other circumstances; as in cerebral injuries, tumours of the brain, meningitis, some liver affections, after inhalation of chloroform or poisoning by corrosive sublimate, or after eating saccharine materials in large quantities. In these cases it is temporary; in diabetes it is constant, although it may sometimes disappear should acute inflammation or fever supervene. TESTS FOR GLUCOSE (SUGAR), SEE PAGE 374.

The COURSE of diabetes is chronic. It is free from fever and the morbid process may come to a standstill. The prognosis is more grave in young subjects than in those after thirty, and statistics show that though its duration may extend over several years, yet three-fourths die in from six months to three years after its first detection; and how? By exhaustion, by œdema of extremities, phthisis, pneumonia, bronchitis, carbuncles, abscess, gangrene, or through inflammation of serous membranes of an asthenic type, or more commonly death takes place in a few days with coma. This coma is not uræmic, for there is an uninterrupted flow of urine to the last, with no marked twitching of the muscles, and the temperature is much lower than normal. It seems a kind of poisoning, and is probably due to the acetone developed in the blood, for acetone given in large doses to animals produces similar results. Hence the term "Acetonæmia" applied to it.

Cataract, which is associated with advanced cases of diabetes, comes on suddenly, and out of two hundred and twenty-five collected cases was detected twenty times. It attacks both eyes, and seems due to the direct action of the sugar influencing the nutrition of the crystalline lens. Other ocular affections, as paresis of accommodation, amblyopia, hemiopia, retinitis, and optic-nerve atrophy, are common sequelæ from this disease. Eczema of the vulva is always a suspicious symptom, and, in fact, it may be the only complaint which a patient makes. Its existence always demands an examination of the urine. When the disease is advanced the Patellar Tendon Reflex is lost.

Treatment.—The great principle in the dietetic treatment of diabetes is to vary the diet and to stick to no hard-and-fast rule. Vegetables are injurious, but all vegetables are not equally so, for experience has shown that green vegetables can be taken without injury. A general rule with regard to vegetables may be thus expressed. ALL GREEN VEGETABLES OR GREEN PARTS OF VEGETABLES MAY BE EATEN, FOR WHEN CHLOROPHYLL OR GREEN-COLOURING MATTER IS ABUNDANT, THEN SUGAR AND STARCH ARE SCANTY. Thus spinach, the green parts of celery and asparagus, Scotch kale, cabbage, watercress, lettuce, and all kinds of green salad may be taken. Cauliflower is doubtful. French beans may be used entire when young; or, when older, by removing the beans. Haricot beans, peas, all cereals, potatoes, carrots, turnips, parsnips, and beetroot, are forbidden. Sugar will produce sugar, but substances sweet in themselves and nearly allied to sugar fail to increase saccharine urine. There is a craving for sweets, and we find that animal fats and glycerine satisfy this to a great extent. Diabetic bread is dry, and diabetic tea is insipid; hence soften the former with butter and sweeten the latter with saccharine. Flesh meat, fowls, and fish, form important elements in the daily fare. Cheese may be given, and also eggs, especially the white. The patient may drink moderately of seltzer water, and to this may be added daily 2 to 4 ounces of brandy or whisky to aid digestion. Ordinary milk contains about 4 per cent of sugar, yet it is found that neither milk nor cream notably increases the quantity of sugar, and to many a milk diet is very grateful; all sweet wines—champagne, port, or sherry—should be avoided, yet red wines can be taken. Eschew also, as far as possible, highly farinaceous articles—bread, rice, sago, tapioca, and arrowroot. A pleasant form of biscuit suitable for diabetics is prepared by Walker, Glasgow, and can be highly recommended. It is made from gluten and eggs, sweetened with saccharine, and is very palatable. It is now used in most cases of diabetes in all the

hospitals of Glasgow. Von Abbot's various kinds of diabetic biscuits can also be recommended. Medicinal treatment has failed as yet to arrest the sugar formed in diabetes, though many drugs have been tried, including lactic acid, carbolic acid, creasote, tincture of iodine, arsenic, iodide of potassium, and the various preparations of opium. Of the latter, codeina in half-grain doses and upwards seems certainly to have the effect of reducing the quantity of urine; but it does so at the expense of the appetite, for the patient will be found to become weaker and lose weight by its continuance. Sulphonal is said to diminish the amount of sugar in the urine when given in a dose of 20 grains twice daily. Without entering into details, I may state that I have found the following treatment to fulfil the two chief indications required, viz. relief of thirst and consequent diminution of urine, thereby causing increase of weight and subsequently restored mental and bodily vigour.

1. $\frac{1}{20}$ of a grain of nitrate or hydrochlorate of pilocarpine is placed on the tongue thrice daily. This causes increased salivation and what a Scotch diabetic terms "sappiness" of the mouth.

2. Five grains of pepsine and 20 of dilute hydrochloric acid are taken after every meal for three weeks.

3. This is followed by a mixture of phosphates (F. 91*a*), which is continued for months.

4. If there is not a natural action of the bowels daily, an enema is always insisted on.

5. If the patient can afford it, a yearly visit should be paid to Carlsbad or Vichy, or Neuenahr or Vals, for it is found that patients using these waters void little sugar, and can take vegetable diet with comparative immunity.

FEIGNED DISEASES

Much of the success of a medical practitioner depends on his being able to detect the early symptoms of any disease, and to base his treatment accordingly. Occasion-

ally, diagnosis is very difficult; and, in the case of the exanthemata, it is well not to make a strong assertion until the characteristic eruption appears. In other instances, under the influence of a weak nervous organisation, certain diseases may be feigned, through as it were paralysis of the will and with no deliberate intention to deceive. Hypochondriasis and hysteria furnish notable examples of such cases; and paraplegia, incontinence of urine, joint affections, and anæsthesia or hyperæsthesia of the skin may be assumed. Marked sympathy being shown him or her, usually the latter, such a patient may become bedridden. The treatment, if the diagnosis is correct, is plain—strong measures and not drugs being the principal agents by which to effect a cure, and so restore an apparently afflicted person to sense and reason and action.

But in a third class, of what may be more properly termed "Feigned Diseases," there is deliberate imposture. Thus blindness, deafness, paralysis, or epilepsy may be assumed; and jaundice and insanity counterfeited. It is important to remember that in the majority of cases the impostor overacts his *rôle*. Blindness, deafness, or paralysis assumed are not proof against some sudden shock or mental impression. In jaundice, though vomiting may be induced, yet the conjunctivæ of the eyes cannot be made yellow. In epilepsy, if a fit occur, it is too much prolonged, the tongue is not bitten, and there is a vast amount of struggling without any actual injury, conditions not seen in a true epileptic fit. In feigned insanity no definite rules can be laid down. Common sense and experience must guide the practitioner, and no doubt the benefit of a specialist in mental diseases should be sought. When incontinence of urine is simulated, it is often found that the urine does not dribble away, but is attended with an expulsive effort; and in feigned hæmoptysis there is no proper streaky admixture of blood with mucus.

DISEASES OF RESPIRATORY ORGANS

Accurately and intelligently to understand these, it is necessary to be familiar with the meaning and importance of certain terms which are met with in the description of diseases of the chest. The air in breathing passes into the trachea, the wall of which is comparatively rough in three-fourths of its circumference, with strongly-marked cartilaginous rings, and the current of air entering is great and quick. Below the bifurcation of the trachea the bronchi divide into smaller and smaller tubes; the cartilaginous rings become less and less distinct, until, in the terminal ramifications of the bronchi, they cease to exist, and the tubes are smooth on their internal surface.

If the stethoscope is placed over the trachea, two rough harsh sounds of equal length will be heard, the one accompanying inspiration, the other expiration, with a distinct interval between them. This is what is termed "tracheal or cavernous respiration."

Next, on placing the stethoscope on the upper bone of the sternum, opposite the point at which the trachea divides into the bronchi, we hear a modification of the tracheal breathing, the character of the sound being hollow, blowing, and soft, and with the inspiration rather longer than the expiration, and they are still separated by a slight but appreciable interval. This is "bronchial respiration" or "tubular breathing."

Again, on listening over other parts of the chest, it will be found that the blowing character is gone, that the inspiration is soft and gentle, that the expiration immediately follows it, and is less prolonged. The combination of the two constitutes the healthy vesicular murmur.

If the person is told to speak when the stethoscope is at the different situations mentioned, it will be found that the character of the voice also varies. Thus, over the trachea it seems as if he were speaking right into the

ear, so loud and full is the sound; even a whisper can be heard. This is "pectoriloquy."

Over the sternum it is still distinct and clear, but not so loud. This is "bronchophony."

Over other parts of the chest, on the other hand, a buzzing scarcely audible sound is heard.

These sounds, as will be seen, are significant of various diseases when heard in parts of the chest where in health they are not detected.

The mucous membrane lining the respiratory tract is in health moist, but not too much so, else this also would give rise to disease. As illustrating terms used, and various conditions, let us suppose a common cold is caught. The effect of this on the mucous membrane of the respiratory tract, if it extends to it, is, first, to make it dry; secondly, swollen and inflamed. The consequence is an alteration in the character of the sounds where the vesicular murmur is heard. If the larger air-tubes are alone involved, a deep-toned note will be produced like that of a person snoring in sleep, or a humming like that of a spinning top; hence it is often described under the terms cooing, snoring, buzzing, or technically, "sonorous rhonchi." If the dryness extend to the smaller air-tubes, the sounds are shriller in character—piping, whistling, hissing, or technically, "sibilant rhonchi," sometimes termed "dry râles." These sounds may occur separately or together, and, if together, there is frequently a combination of the characters of both heard on auscultation, giving rise to a strange medley of cooing, whistling, piping, and snoring.

The mucous membrane in a cold, although still inflamed, does not remain dry, but becomes moist, and hence the dry sounds are replaced by moist ones. The air passes through liquids, and, in doing so, gives rise to bubbles, and these liquid sounds are termed "moist râles." If these are fine, and confined to the smaller air-tubes, the term "small crepitation" is used; if on a larger and coarser scale, involving the larger air-tubes, they give rise to "large crepitation." These two liquid sounds may and

often do merge insensibly into one another, so that they are often heard in the same chest during the same complaint.

It will thus be observed, as the annexed diagram will show, that we have "sonorous rhonchi" and "large crepitation" as representing the dry and the moist sounds

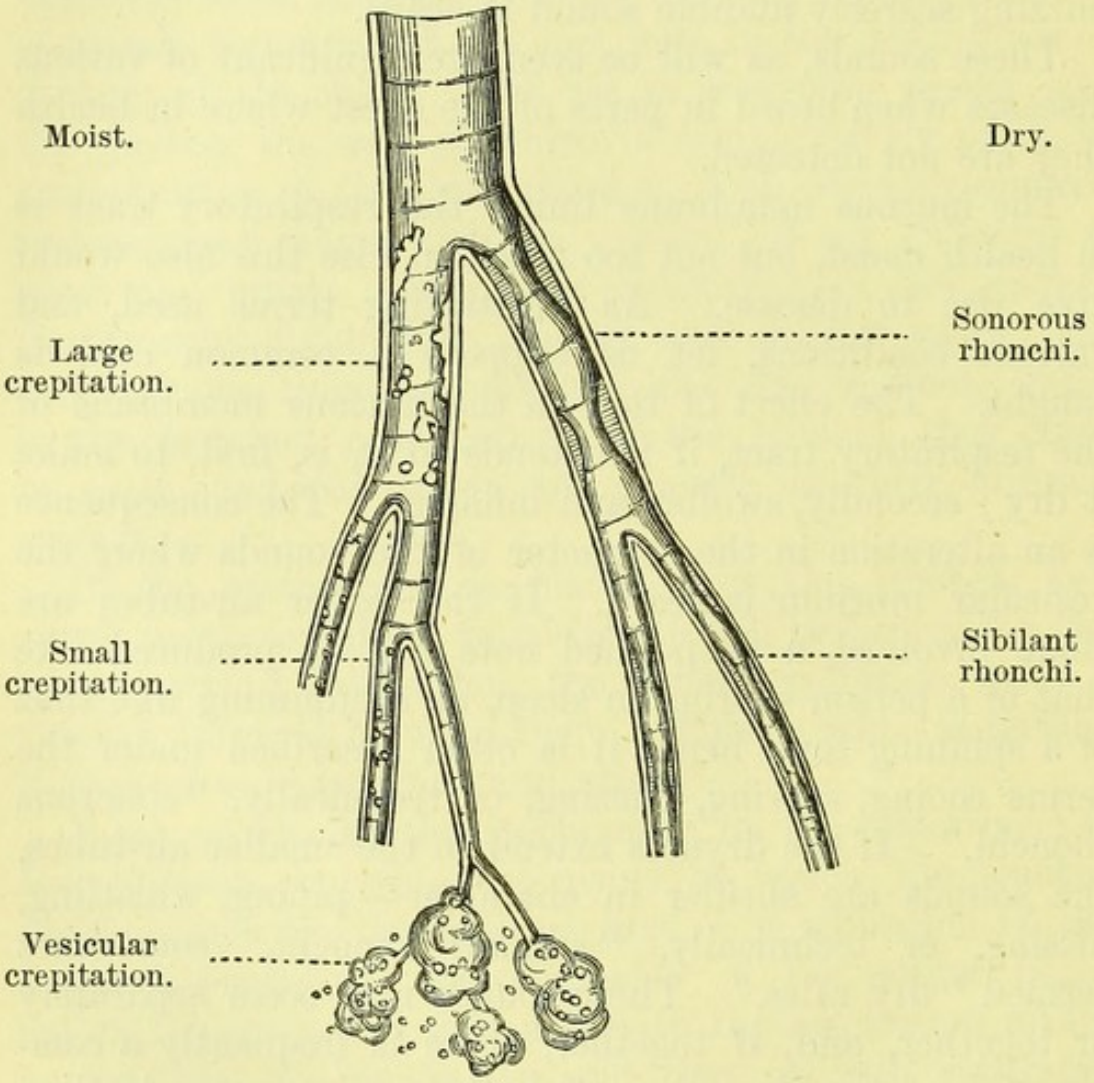


Fig. 7.

of the larger air-passages; "sibilant rhonchi" and "small crepitation," in a similar manner, being applied to the smaller air-passages.

Leaving the mucous membrane as seen in its inflammation from a common cold, we may say further that moist sounds are produced by bubbles of air traversing or bursting in a somewhat viscous fluid. Hence they may be formed, not merely in the bronchi, but in the terminal air-vesicles, or on a larger scale in cavities or ulcers of various sizes. They may thus be fine, scarcely

audible, or coarse, resembling gurgling and splashing, and between these two extremes there are various gradations. A sub-crepitant or muco-crepitant râle is produced in the minute bronchioles and alveoli by the penetration of air through a thin liquid. It is a sharp, well-defined sound. Between this and the true dry crepitation there are many intermediate sounds which may be described according to their size as fine or coarse. *Dry crackle* is significant of three or four distinct small dry crackles heard during inspiration, and is a marked evidence of commencing softening in the tubercular deposits of phthisis, in the subclavicular region. *Moist crackle* or *humid clicking râle* is significant of liquefaction of tubercular nodules in connection with a bronchial tube, and as liquefaction advances by the increased softening and breaking down of these deposits, these crackles or clicking râles develop into the gurgling or cavernous râle of the late stage of phthisis.

The chest in health on being percussed gives everywhere a clear reply; the note on both sides being similar in similar situations, unless where on the left side the heart intervenes. In the course of some diseases it will be found that one side is more expanded or retracted than the other, and it is necessary to estimate the exact difference between them. For this purpose mark with ink the central spots over the spinal vertebræ and the sternum, and stretch a graduated tape between them on both sides, telling the patient to hold his breath during the experiment. In cases where there is any difference note whether it increases or diminishes at regular periodical visits.

Vocal fremitus is the peculiar thrilling sensation conveyed to the hand applied to the chest when the patient speaks. With regard to this it is to be noted, that the sensation in health varies according to sex and age. It is heard better in the deep tone of a man's voice than in the higher pitched tone of a woman or child. It is also increased in consolidation of the lung tissue by disease, as in the second stage of pneumonia, provided the bronchi are patent, and it is diminished or lost in pleurisy with

effusion on account of the fluid between the lung and the chest-wall.

The chief points to be attended to in forming a *diagnosis* as to diseases of the respiratory system are as follows :—

1. *Inspection.*—Shape of chest—normal, barrel shaped, bulging or shrinking ; respirations—character and amplitude, and rate per minute, with also the pulse-respiration ratio.
2. Antecedent history ; dyspnœa ; cough, expectoration ; localised pain.
3. *Percussion.*—Clear ; hyper-resonant ; dull. If dulness at base, whether absolute or not ; if at apex, whether attended with abnormal sounds as metallic or cracked-pot.
4. *Auscultation.* — (Respiratory murmur) ; tubular ; moist or dry ; general or localised ; râles ; crepitation coarse or fine.
5. *Palpation.* — Fremitus — increased, diminished, or altered.
6. *Mensuration.*—If one side of the chest be expanded or retracted. Mark the difference on each side by a measurement from vertebræ to central spot on sternum by means of cyrtometer.

INFLUENZA—*Synonym*, Epidemic Catarrh

Influenza may be defined as a specific epidemic disease in which there is catarrh of the nose, throat, and air passages.

The name influenza is of Italian origin, and came into use two centuries ago. Its history is supposed to date back into remote antiquity. Whether this be true or not is a question, but undoubtedly during the last four centuries, the periods during which influenza has prevailed have been carefully recorded, and Dr. Parkes states that there were eleven epidemics in the sixteenth century, sixteen in the seventeenth, and eighteen in the eighteenth. Between 1800 and 1850 there were no

fewer than ten, the last being in 1847-48. It was supposed that the disease had ceased to exist, when in 1889 an epidemic commenced in St. Petersburg and spread nearly all over Europe and to America. The epidemic is not sporadic. It appears to obey no law, but attacks one town and spares another in close proximity, and moves with a celerity by atmospheric influence far outstripping that of any other contagious disease. Our present knowledge of it only corroborates that of preceding ages, and may be summed up in the statement that it must be regarded as a specific infection, and dependent on some poisonous influence in the atmosphere, the nature of which is unknown.

Symptoms.—The onset of the disease in most cases is sudden, so sudden that it has been termed *Lightning Catarrh.* There is first a chill, succeeded by heat and dryness of the skin, general malaise, and great prostration. Afterwards there is cough, with expectoration, at first scanty, afterwards copious, and much defluxion from the nostrils. The conjunctivæ and throat become red, the tonsils swollen, and the difficulty of swallowing is extreme. In all cases there is prostration, sometimes very distressing, with dragging pains in the limbs and inability to move about, or even to enter into conversation. There is no great increase of the pulse, which usually averages from eighty to ninety beats in the minute, and rarely exceeds one hundred. The urine is scanty. The ordinary duration of the disease is four or five days, and it subsides with perspiration, diarrhœa, and an increased flow of urine. Relapses are not unfrequent.

Varieties.—Sometimes influenza is complicated with *chest affections*—acute bronchitis or pneumonia—or with disorder of the *digestive system* and *rheumatic pains.* With the *pulmonary complications* the symptoms are serious and grave. The pulse is rapid, the respirations are quick, with delirium and great loss of strength. The duration of this form of influenza, in cases which prove fatal, is from ten to fourteen days, and when recovery takes place the patient is ill from two to three weeks.

With the *digestive complications* there is not much danger, but convalescence is slow.

During an epidemic of influenza, of whatever type, the death-rate of a town is increased, especially from zymotic diseases. Influenza seems to modify such diseases, and for the worse.

Diagnosis.—The great number of persons attacked, and the severe prostration, distinguish influenza from an ordinary catarrh, with which it is most likely to be confounded.

Treatment. — All lowering treatment is inadvisable, and all attempts to cut the attack short are futile. When the attack comes on the patient should not try to fight against it, but go to bed, and remain there until convalescence is assured. Prominent symptoms observed should be met by the following treatment:—The attendant *fever* by liq. ammon. acet. and sp. aeth. nit. (F. 31), until diaphoresis is established; the *cough* and *tightness* of the chest by the application of linseed-meal poultices; the inhalation of steam alone at night, or inhalations of 2 per cent of ichthyol twice daily for a quarter of an hour or twenty minutes; ipecacuanha wine 25 minims on sugar, or as trochisci ipecacuanhæ; the touching of the tongue with glycerine; *Rheumatism* by salicin 30 grains, or salicylate of sodium 25 grains every three hours. In any attack, mild or severe, quinine should be given twice daily in a two or three grain dose at 12 and 4 o'clock, with half a glass of sherry.

Diet.—Nourishing soups, fish, arrowroot.

DIPHTHERIA (Croup, *Cynanche contagiosa*)

Although a disease similar to diphtheria seems to have been well known to the ancient physicians, yet its existence in England under the term diphtheria (a skin or membrane) dates back only to 1856, when it spread from France to this country. The first accurate investigations into the nature of diphtheria were made by Bretonneau

in 1821. He considered it was a local disease, spreading by contagion through the inoculation of the soft mucous membrane with the diphtheritic exudation. He was subsequently obliged to concede that blood-poisoning was one of its essential characteristics. As its derivation shows, diphtheria is evidenced by the presence of a membranous substance. This substance is the result of inflammation, and is most often seen over the tonsils, uvula, and upper air passages, but it must be remembered that though most often visible in the parts mentioned, diphtheritic inflammation may occur in the mucous membrane of any part of the body or upon any wounded surface.

Pathology.—The teaching of modern pathology, chiefly of Wagner, Weigert, and others, shows that there is no essential difference between croup and diphtheria, and hence croup is not now considered by them and those who adopt their views as *per se* a disease. A brief outline will now be given of the views of these authorities. A fibrinous exudation is characteristic of the croupous-diphtheritic inflammation, and this inflammation is milder in the croupous form than it is in the diphtheritic. The diphtheritic exudation covers an ulcerated surface, which manifests not only death of the epithelium, but of the underlying mucous membrane as well; while in the croupous form the epithelium is alone involved, and leaving, when the exudation is stripped off, no ulcerated surface beneath it. The exudation is in both cases grayish ashy-white in colour, and its consistence is like that of wetted parchment or damp wash-leather. It is composed of glistening homogeneous fibrin, disposed in the form of a network, of which the meshes vary in form and size, and enclose epithelial cells, blood and pus corpuscles, and micro-organisms of every description. With reference to the *micro-organisms*, we may state that hitherto the newer bacteriological methods of investigation have not thrown much light on the subject. The researches of Löffler, and the discovery by him and Klebs of supposed distinctive bacilli, gave rise to the hope that

we had attained to an easy method for the diagnosis of diphtheria; but more recent investigations, and especially those of Hoffman-Wellenhof, have shown that the difficulty is not yet solved. If recovery takes place in croup all that is needed after the exudation has been cast off is renewal of the epithelial layer; while in diphtheria a wider and more extensive process is necessary, viz. sloughing off of the entire membrane, which is replaced by cicatricial tissue. The significance of Virchow's statement can thus be apprehended when he affirms "that the removal of the fibrinous membrane in croup may give permanent relief; but in diphtheria depending on wider and deeper causes, it only affords a questionable and non-abiding recovery from grave symptoms." While we thus admit the identity of the pathological membrane in croup and diphtheria, it seems very difficult to regard them in their clinical history as one and the same disease. We shall therefore consider the symptoms of croup and diphtheria individually, and not as part of one affection, and we may state that in a single case, while the possibility that the disease may be diphtheria can never be positively denied, yet the points of distinction most to be relied on in the early stage in favour of croup are—(*a*) The suddenness of the attack; (*b*) the absence of a history of contagion either in the family or in the neighbourhood; (*c*) the direct exposure to cold or unseasonable weather; (*d*) the age of the patient.

Symptoms of Croup.—Preceded or not by slight catarrh, the true symptoms of croup set in very suddenly, coming on towards the evening or perhaps during the night. The child wakes with an unusual cough, and the inspirations which immediately follow the cough are long and attended with the *crowing* sound characteristic of the disease. The respirations, at all times laboured, are occasionally subject to spasmodic exacerbations, in which the distress is excessive. There are also fever, a pulse frequent and hard, extreme restlessness, and great thirst. If the disease proceed unchecked, all the symptoms are quickly aggravated. The respiration becomes more

laboured, the cough more troublesome, the expectoration more and more difficult, until the child dies, either in a paroxysm of dyspnœa or gradually by suffocation.

The usual duration of the disease, when severe and unaided by medical treatment, is about thirty-six or forty hours. If the alarming symptoms are not moderated in twelve hours, it generally proves fatal. If aided by treatment the severity of the symptoms decreases and the child recovers, yet convalescence is tedious, and is frequently attended by expectoration of portions of membrane. In a milder form of the disease, where the difficulty of breathing is not so grave at the commencement, the cough on the second day becomes loose, the fever declines, the skin becomes moist, and the crowing sound of the voice ceases.

Ætiology and Symptoms of Diphtheria.—There seem to be good reasons for believing that diphtheria has appeared in some cases to be due to polluted water, bad drainage, or foul air, and it is certain that it may be transmitted by milk. Recent researches of Klein give circumstantial evidence that cats suffer from a form of diphtheria similar to that which affects human beings, and to the possibility that cats may have been the originators of epidemics of diphtheria among the human inhabitants of the households to which they belong. However originating, the symptoms of diphtheria are diverse. They follow no rule. They may be attended with fever and marked constitutional disturbance, or the fever may be slight or altogether absent. With or without fever we may say that the general features are prostration, restlessness, headache, and nausea, and a sense of stiffness and soreness about the neck and the angles of the jaw. There may be some difficulty in swallowing, and the pain accompanying this varies, being sometimes pricking or severely darting and shooting. When the fauces are examined at an early stage they will be seen to be swollen and violet-red in colour, and the same swelling and redness are observed on the uvula, palate, and posterior wall of the pharynx. On the violet-red

surface after a few hours, or at most two days, characteristic evidence of diphtheria is seen in whitish-gray spots, small at first, and distinct.

In favourable cases, and with little constitutional disturbance, recovery takes place in two or three days, and the white spots are no longer seen. But in the majority of cases the disease advances. The spots cease to be distinct, they run into one another and extend in every direction, so that no longer spots but exudations are seen. These exudations may creep backwards and upwards into the posterior nares; or more frequently they pass over the epiglottis into the larynx and trachea. The cervical and submaxillary glands, at first only sore and stiff, become swollen, and the tissues around are also œdematous from the infiltration of inflammatory products. In consequence the "hollow of the neck" disappears and a uniform brawny mass conceals the natural condition of parts. Shortly afterwards the exudations soften and decompose, and are partly shed in patches of membrane. As the result of this the breath becomes fœtid, saliva dribbles from the angles of the mouth, and swallowing becomes very difficult. These serious local symptoms are accompanied by great constitutional depression, the pulse, though quick, becomes daily smaller and weaker, marked blanching is seen on the face, and the muscular strength is visibly diminished. A typhoid state may develop with sordes on the teeth and lips, and with delirium of a low type. Such cases usually end in death through pneumonia or œdema of the lungs, or through suffocation, or by gradual asthenia. Often death takes place suddenly from syncope while the patient is attempting to sit up, and this may occur even when recovery seems to be complete.

It is a noteworthy fact that the urine is found albuminous in 50 per cent of the cases.

The dyspnœa of diphtheria is due to several causes, acting together or in succession—the most important of these being the *mechanical* one, viz. the swollen mucous membrane on the one hand, and the muco-purulent secretion on the other, obstructing the narrowed glottis. To

these purely mechanical causes must be added another of subordinate importance, viz. *the paralysis of the laryngeal muscles.*

Sequelæ.—In non-fatal cases the specific disease is supposed to terminate on the seventh day, although the convalescence after this is slow and attended with great depression. After the complete healing of the local lesions, in the course of the second or third week of the disease various sequelæ may ensue, viz. paralysis of the soft palate and pharynx, and paralysis of the muscles of the larynx, occasioning in the one case difficult deglutition, in the other impaired voice. Sometimes there are great disturbances of vision and progressive paralysis of the extremities.

The course of the paralysis mentioned is gradual and characteristic, paralysis of the soft palate and pharynx being first noticed. This is followed, either immediately or shortly afterwards, by impaired vision, while paralysis of the upper and lower extremities occurs later. The ordinary termination of diphtheritic paralysis is in cure, and it is also noteworthy that the muscles which were first paralysed are also the first to recover their activity. The process of cure occupies from six or eight weeks to two or three months. A fatal termination has been noted in 8 to 10 per cent of diphtheritic paralysis cases, but then only through intercurrent diseases, or from food entering the larynx, which is paralysed, and thus causing suffocation, or setting up broncho-pneumonia.

Prognosis.—The average mortality of diphtheria ranges between 30 and 40 per cent. The disease is more fatal in young children than adults, for in adults the grave laryngeal type is not often seen.

Treatment of Croup.—Formerly leeches were always applied in cases of croup; now the most consistent line of practice is to use them only when children are vigorous and plethoric. Leeches cannot stop the exudation, but they seem to prevent the swelling and infiltration, which might prove fatal. They are applied to the manubrium sterni, not to the larynx, as the bleeding there may be

difficult to restrain. They ought never to be applied to puny and badly-fed children. Emetics are useful, and of these the sulphate of copper is to be preferred to zinc, as tending less to weaken the system. 10 to 15 grains of the former should be dissolved in 2 ounces of water, and a large teaspoonful of this given every five minutes until vomiting is produced. Ipecacuanha may also be used—a teaspoonful of the wine being given at frequent intervals until the child vomits (F. 42).

If the vomiting relieves the dyspnœa and expels the false membrane, it has done good and ought to be repeated. If it fails in these objects its repetition is contraindicated. A solution of nitrate of silver should be applied at intervals of several hours to the entrance into the larynx. The bowels should also be acted on either by an enema or calomel. If, with the addition of a warm bath, hot pack, or hot sponging, these means fail, after a trial of twelve hours, tracheotomy should at once be resorted to.

Treatment of Diphtheria.—The general treatment of diphtheria is based upon the fact that we have to deal with a disease which notably saps the strength of the patient. An even temperature of 65° to 68° F. is essential, and the patient must be kept confined to bed. But an even temperature and rest will not tide a patient over an attack of diphtheria. Other means are requisite, and of these undoubtedly alcohol stands first. In all but trifling cases the heart begins to flag, and stimulants must be given with no stinted hand at very short intervals night and day. Sir William Jenner relates a case of a child of three years of age who had from three to five ounces of brandy given to him with advantage in twenty-four hours. While no general rule can be laid down as to the amount to be ordered, yet it is to be remembered that quantities far larger than those mentioned in Jenner's case may be given to children without producing any toxic effect. Soups of a very nourishing character, preferably turtle soup, are also necessary. Patients should be encouraged to suck ice freely.

The medicinal treatment in this country is usually in the form of the tincture of perchloride of iron with glycerine, or with glycerine and chlorate of potassium. Thus—

℞ Tinct. Ferri Perchlor. ℥ii.
Potass. Chlorat. gr. xl.
Glycerini ℥i.
Aquæ ℥v. M.

A teaspoonful every 15, 20, or 30 minutes. The hypodermic injection of pilocarpine has also been praised as tending by its action on the salivary glands to assist nature in dislodging the false membrane. In the United States the treatment adopted from the very commencement is perchloride of mercury, and latterly this treatment has received the high approval of Jacobi—

℞ Hydrarg. Perchlor. gr. i.
Sodii Chlorid. ℥ss.
Glycerini ℥iss.
Aq. Destill. ℥iiss. M.

One teaspoonful every two hours, preceded by a free drink of water.

This method of treatment, supplemented by the use of the same salt as an antiseptic spray in the strength of 1 to 4000, when the disease attacks the nasal cavities, appears to be gaining ground in this country. But the action of mercury so given is slow, and as diphtheria marches rapidly I am induced to think, from an experimental research with chemically pure carbolic acid, which I have lately concluded, that it might be tried with advantage and safety in a dose of two grains every two hours. This acid controls the development of pathogenetic micro-organisms outside the body, and presumably it would check, when given, their development in internal diseases.

Local Treatment.—Tearing off the membranous exudation is absolutely negatived, and applications of caustic have also been practically abandoned in this and other countries. Diluted chlorine water, or lime water (which has the power of dissolving diphtheritic membrane) has

been advocated as a gargle. So also have solutions of permanganate of potassium, one and a half grains to an ounce of water; and of carbolic acid gr. ii. to an ounce of water. Turpentine has been used as an inhalation; a teaspoonful of the oil can be poured on water kept at the boiling point by a spirit lamp. The air of the room is thus charged with the remedy. Some speak highly of the insufflation of sulphur, in order to destroy the organisms present in the pharynx, in the same way as in the vine-disease. If the disease attacks the nasal cavities, the nostrils should be frequently syringed with the permanganate or carbolic acid solution. Oertel recommends that the vapour of boiling water should be inhaled for a quarter of an hour at a time, twice every hour, and states that art thus aids nature in setting up a suppurative action by which the false membrane is thrown off. Outward applications, either hot or cold, to the throat are of little use.

If death by suffocation is threatened by laryngeal obstruction, then the question of tracheotomy must be considered. The results from this are not very encouraging. On an average only one-third to one-fourth of those operated on recover. Tracheotomy cannot be of any use if the exudation has extended to the bronchi, or if the constitutional affection is in itself dangerous and has initiated failure of the heart's action.

Diphtheritic paralysis is rarely fatal. It generally subsides within three or four months without treatment, and this period may be shortened by tonics, as iron and strychnine first, and later on by careful electric stimulation with the constant current.

HOOPING-COUGH

is an infectious disease, which usually occurs in childhood, and is preceded by a catarrh, without fever, of three to fourteen days' duration. Succeeding this there is a peculiar characteristic paroxysmal cough, which is heard

in no other affection. The child has usually some premonitions of an attack, and runs to its mother or nurse for protection, or it may cling to a chair or table for support. Then commences a distressing series of expiratory efforts with no noticeable inspiratory movements between them. The face of the child becomes black and suffocation seems imminent, when there occurs a long-drawn inspiration attended with a crowing or hooping sound. This paroxysm may at a short interval be succeeded by others of varying intensity, and the conclusion of the attack or attacks is by expectoration of thick mucus from the lungs or by actual vomiting. The sound heard is doubtless due to the air entering the contracted, or even partially closed, rima glottidis. When expansion of the glottis has been completed and the air is permitted to enter freely, the attack for the time is over.

The paroxysms occurring in the twenty-four hours vary as regards intensity. As a rule they are worse at night. During the early stages of the disease the mucus expectorated is thick and glairy, but afterwards, when the paroxysms are not so severe, it becomes thinner, more abundant, and more easily brought up.

Only catarrhal sounds, or perhaps no abnormal breathing, are detected by a stethoscopic examination. The expiratory paroxysm may reveal wheezing, but during the long-drawn inspiration no sound can be heard over the lungs. This may be partly explained by the slowness with which the air enters by the contracted glottis, and partly, as Laennec says, by "the spasmodic contraction of the muscular or contractile fibres of the bronchi not allowing the air to enter."

Sequelæ.—Hooping-cough may lead to pulmonary emphysema, and in some cases to extravasation of air into the interlobular and subpleural tissue.

Etiology.—The peculiar spasmodic cough in this disease has given rise to many theories, which attempt to explain its nature. Some deem it a neurosis; some consider it a catarrh of the respiratory mucous membrane; some maintain that it is due to swollen tracheal or bronchial

glands pressing on the vagus. These theories do not throw conclusive light on the origin of hooping-cough which seems to be clearly of an infective character and markedly contagious. The nature of the contagious principle has not yet been definitely established, but probably it exists in the sputum as a bacterium or a fungus.

Prognosis.—A paroxysm of hooping-cough is rarely fatal, but as the result of the closure of the glottis, rupture of an intracranial vessel may occur, or disease of the brain or its membranes may be originated, with effusion of serum and a fatal termination. More frequently, however, pulmonary complications, as bronchitis or bronchopneumonia, occur, which in weakly and delicate children are very dangerous; so much so that one-half or two-thirds of those who are attacked in this way die.

Treatment.—If we assume that hooping-cough is an infectious disease, dependent on the presence of specific organisms, then the antiseptic treatment by inhalations of carbolic acid may do good, if carried out in a thorough and satisfactory manner. To accomplish this the child or children of a household affected should be put in a small room, where there is a fireplace, and where the temperature can be properly regulated. The vapour of carbolic acid, which is developed by dropping the pure acid from time to time on a hot plate, then permeates the room. Direct inhalation of a spray containing pure carbolic acid gr. 4, glycerine 60ɱ, and carbonate of sodium 10 grs., to an ounce of hot water, is still more effective. While using the spray it is necessary to examine the urine frequently, and if any discoloration is detected, the inhalations should be suspended for twenty-four hours. The treatment so adopted cuts short the paroxysms and lessens the severity of the disease, but it does not seem to have any prophylactic influence.

Various methods of treatment in addition have their advocates. Thus Dr. Fuller recommends gradually-increasing doses of belladonna (F. 15*a*); Dr. Gibb nitric acid (F. 15); others speak highly of a combination of bromide of potassium and hydrate of chloral; or hydro-

bromic acid made up with syrup—the dose of which for a child of three years being 8 or 10 minims. Antipyrin has also been highly recommended.

The use of emetics has found favour which is not undeserved, because it seems to imitate the manner in which nature terminates a paroxysm. At a stated period of the day or night vomiting should be induced by vinum ipecacuanhæ, or the internal use of apomorphine. Locally, Roche's embrocation has considerable popularity among the poorer classes. If the child submit without coercion or great struggling, a solution of nitrate of silver, 2 grs. to ℥i of water, may be applied to the fauces daily. Should there be great resistance on the child's part, the application of the remedy will do more harm than good.

If bronchitis set in, poultices should be applied to the chest, probably after leeching, with the internal administration of antimonial or ipecac. wine. If requisite, these may be followed by stimulants.

Head Symptoms.—Squinting, convulsions, or stupor, must be met by small and repeated doses of hydrarg. c. cretâ, warm baths, etc.

Niemeyer says: "Hooping-cough can be cured on the principle that 'he who spareth the rod spoileth the child,' and that the cough of hooping-cough is not an exception to the physiological law, 'that violent reflex symptoms are controllable by the will.'" Hence he advises coercion, the promise of no bonbons or toys if coughing is persisted in, and states that the effects of this mental dietetic are admirable.

Dietetics.—The patient should be kept on a regulated diet, with plenty of milk and light puddings, and little meat, while excitement of every kind should be carefully avoided. When the air is cold the patient should not be allowed to go out of doors, but when it is mild and genial a daily mid-day walk is attended with benefit. If the disease linger in its course a change to the seaside, if the time is suitable, does good. In mining districts change of air is sometimes effected by taking the child down a coal-mine.

CATARRH

We have commenced, and, to a certain extent, illustrated in the preliminary remarks the effect a cold has upon the chest when it attacks the mucous membrane of the respiratory tract. It may, however, stop at the head, affecting only the nose (coryza) or the frontal sinuses (gravedo), giving rise at first to dryness, and afterwards to what is termed running at the eyes or nose, and a profuse muco-purulent discharge. The concomitant general symptoms vary from weariness and stuffiness of the head to actual headache and some distinct feverishness, with inability to attend to ordinary duties.

The aim in treatment is to endeavour to keep the catarrh at its place of origin. How are you to stop a cold? Catch it at its commencement, and treat it by an opiate. Twenty drops of tincture of opium, or ten drops of liq. morph. and eight of vin. antimon. given twice at an interval of three hours, will usually accomplish this. A simple and effective method has also been suggested—viz. to forbid the use of any kind of liquid for twenty-four or forty-eight hours. In this way the materials for flux are minimised, and it dies of inanition. A Turkish bath can also be recommended. Spirit of camphor sprinkled on a handkerchief and inhaled quickly checks the running at the eyes or nose, and may be repeated if it occurs. Inhalation from a menthol cone is also very advantageous. Quinine x. grains is also highly recommended as checking incipient catarrh. It may be given suspended in milk. For "chronic sneezing," peculiar to some people in the early morning on leaving their bedrooms, or on entering a cold room, the same remedy can also be recommended, or the inhalation of alum, 10 grs. to the ℥i of water. The iodised steam arising from 30 to 40 drops of tincture of iodine placed in two pints of boiling water may also be inhaled night and morning for five minutes.

LARYNGITIS, ETC.

The extension of a common cold to the larynx, leading to congestion and slight inflammation of the mucous membrane, is by no means uncommon. It is evidenced by hoarseness, soreness in drawing in the breath, and a dry tickling cough, and is attended with no danger. "Acute laryngitis" is a much more severe, and fortunately a rare affection. It is peculiar, generally speaking, to adults, and due usually to exposure to cold or wet, or to the inhalation of vapours or dust. Œdema of the glottis, culminating in "acute laryngitis," may be produced immediately by the fumes of irritating gases, and by the accidental swallowing of boiling water. In whatever way "acute laryngitis" originates, its symptoms are well marked. Thus, there is pain in the region of the larynx, notably at the pomum Adami, and this pain is increased by pressure externally, while internally there is a feeling of great dryness and soreness, and a sensation as if the passage was narrowed. The inspiration is protracted, wheezing, and laborious, the expiration comparatively easy, the voice hoarse or altogether lost, the cough peculiarly imperfect and brassy, and attended with hardly any expectoration. Accompanying these local symptoms of "acute laryngitis," chilliness and more or less fever are found to usher in the disease, except it be of traumatic origin. The face is full and flushed, but if the disease advance unchecked, it becomes pale or livid, while the pulse is feeble and irregular; restlessness is intense and accompanied by a feeling of suffocation—which actually does take place unless relief is afforded—with drowsiness, delirium, and coma. The patient dies asphyxiated, and this, as the symptoms indicate, is due to the rima glottidis having become so swollen as to be reduced to a mere chink, while there is inflammatory effusion into the subjacent areolar tissues. If a laryngoscopic examination can be made, the mucous membrane of the larynx will be observed to be red and swollen, being most markedly

so at the aryteno-epiglottidean folds or the false vocal cords, or at the epiglottis, where all view may be obstructed. The course of the disease is rapid, sometimes carrying off the patient in twelve hours, or at all events before the fifth day. At other times recovery ensues; or the affection may pass into *chronic* laryngitis.

Treatment.—In laryngitis due to and accompanying a common cold, and hence better termed "laryngeal catarrh," it is essential that all talking or undue exercise of the voice should be prohibited; that the patient should keep to his room, which should have a uniform temperature of 63° to 66° F.; that a mild diaphoretic mixture should be given (F. 31), and that the cough should be relieved by inhalations (F. 52), or by a spray solution of bromide of potassium or chloride of sodium, 20 grains to the ounce.

In "acute laryngitis," properly so called, leeches should be applied directly to the larynx of adults or the manubrium sterni of children; or hot water compresses may be employed, and covered with india-rubber cloth. Scarification of the swollen parts by a curved bistoury protected to within a quarter of an inch of the point has been followed by relief of the severe paroxysms. Should, however, marked stenosis occur, and the local means mentioned aided by inhalation (F. 31) fail to give relief, tracheotomy ought to be performed without delay; and thus rest will be allowed to the inflamed part, and relief to the engorged lungs.

CHRONIC LARYNGITIS

Chronic laryngitis may be defined as a low persistent inflammation of the mucous membrane and glandular structures of the larynx, occasionally confined to the glandular structures alone.

The SIMPLE form depends on a too early use of the voice after acute laryngitis, and it may also follow "overfeeding." A peculiar variety called "follicular," "gland-

ular," or "clergyman's sore throat," results from habitual exertion or straining of the voice, sometimes coupled with excessive use of alcohol and tobacco. SPECIFIC forms of chronic laryngitis are observed in syphilis and tubercular diseases.

Anatomical Characters.—The mucous membrane is swollen and hyperæmic; the vessels are dilated, usually in patches; the vocal cords may be congested; but ulceration is rare in simple chronic laryngitis. In the variety called "clergyman's sore throat" the racemose glands are hypertrophied at the base of the epiglottis and on parts of the ventricular bands, the surrounding vessels dilated, the ducts and culs-de-sac enlarged, and their orifices closed, so that the secretions accumulate, and this accumulation may lead to ulceration. Usually the follicles of the pharynx are in a similar condition.

Symptoms.—The symptoms of chronic laryngitis are hoarseness, loss of voice (aphonia), a persistent dry cough, with little expectoration, a sense of dryness with slight pain in the throat, and occasionally dyspnœa after exertion.

Prognosis.—The disease may sometimes subside spontaneously, but usually it is obstinate, and only yields to well-directed treatment. Especially is this the case with the variety termed "clergyman's sore throat."

Treatment.—Absolute rest of the voice is essential. Errors of diet and hygiene must be corrected. The larynx should be brushed every other day with a strong solution of nitrate of silver, 40 grains to the ounce; medicated sprays should be used daily and a solution of tannic acid and alum, or steam of boiling water containing ʒi of tincture of iodine, or 10 drops of pine oil dissolved in spirits, in the pint of water. In the obstinate cases inhalations of steam are attended with great benefit, especially in the glandular variety. Taking a pod of cubebs pepper or the local application of tannin and glycerine is also useful.

tion, the characteristic appearance of the part involved would be redness, with a quantity of red frothy serum escaping on section. The elasticity and sponginess of the lung are diminished, but it still will float in water. The vesicles contain fluid and air, and fine crepitation is heard by the stethoscope. In the SECOND STAGE the redness has yielded to solidification. The part affected has a thick heavy consistence. It no longer crepitates when pressed, and if thrown into water it sinks. Pressed between finger and thumb it breaks down, and from the appearance being like that of liver tissue it has been termed "red hepatisation." Here the fluid in the vesicles has coagulated. In the THIRD STAGE resolution is taking place in the majority of cases, and the lung is coming back to its primary condition. When cut into, a great quantity of reddish or grayish fluid oozes out. Hence some call this "gray hepatisation." This stage may, however, be carried farther into diffuse suppuration, and sometimes, though rarely, into "abscess" and "gangrene."

The change from the first to the second stage goes on rapidly, twenty-four hours or even less being sufficient. It must also be remembered that you may have one part of the lung in the first, another in the second, and another in the third stage, so that the auscultatory phenomena, which come now to be considered, will be found to vary at different sites. The accompanying engraving is intended to show the three different stages of pneumonia, while the upper part is unattacked by inflammation. On applying the stethoscope over an inflamed lung, the healthy vesicular sound may in part be heard, with the addition of minute crepitation during inspiration. What is this due to? Very probably it is formed in the minute spaces of the bronchial terminations and pulmonary vesicles; and by some is considered due to the bubbling of air through the liquid in the vesicles, and by others to the forcible separation of the walls of the vesicles glued together by exudation, and yielding to the inspired air; the sound is best realised by rubbing a lock of hair in the immediate vicinity of the ear or throwing salt on a fire.

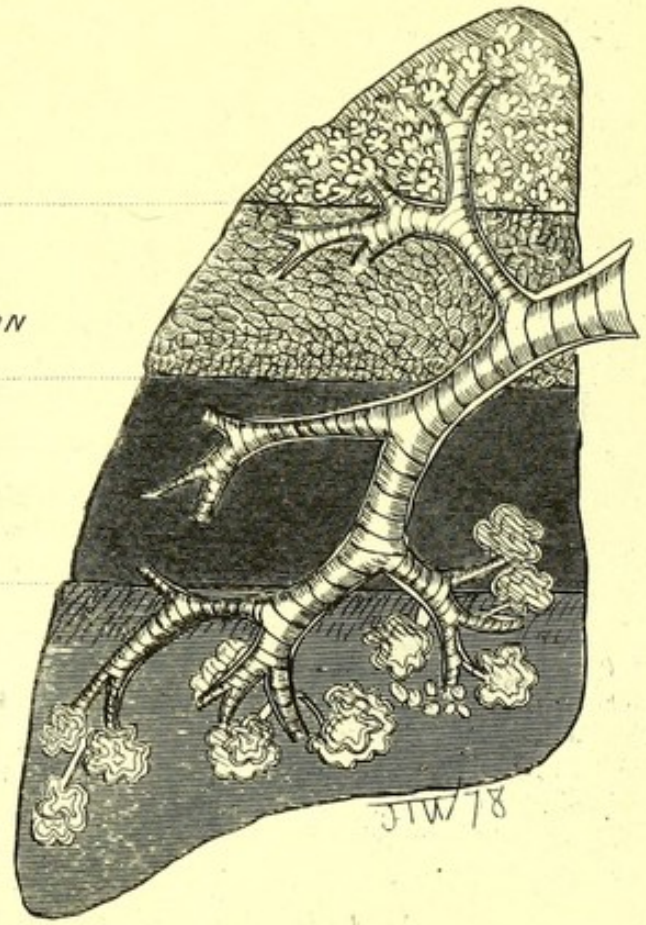
PNEUMONIA.

Normal Lung.

1ST STAGE: ENGORGEMENT.
CREPITATION HEARD ON INSPIRATION

2ND STAGE: COMPLETE DULNESS.
TUBULAR BREATHING.

3RD STAGE: RESOLUTION.
CREPITATION HEARD ON
INSPIRATION AND EXPIRATION.



Treatment.—If attacked by the mouth, the polypus may be torn off by forceps, or cut by knives, or crushed by an ecraseur. Should the growth be very large, thyrotomy (division of both thyroid and cricoid) may be necessary, and through the artificial opening the growth or growths may be removed.

NEUROSES OF LARYNX.—Sensory Neuroses.—*Hyperæsthesia* of the laryngeal mucous membrane may accompany acute or chronic inflammation, or it may be a hysterical symptom.

Anæsthesia occurs as a sequel of diphtheria, or when the superior laryngeal nerve or its centres are affected. It is usually associated with paralysis of the muscles of deglutition, and of the depressors of the epiglottis, and leads to food passing into the larynx, which is deprived of its reflex sensibility.

PARALYSIS OF THE LARYNX.—Loss of power in the laryngeal muscles depends on various causes. Thus paralysis of the superior laryngeal nerve, supplying the crico-thyroid muscle, in addition to the anæsthetic symptoms previously mentioned, prevents due tension of the vocal cords, and establishes loss of voice.

Complete paralysis of the muscles supplied by both recurrent laryngeals, the motor nerves of the larynx, causes the vocal cords to become fixed and immovable; but disease or pressure on one of these nerves paralyses only certain groups or individual muscles.

Perhaps the most common lesion is paralysis of the ABDUCTORS (posterior crico-arytænoids, etc.), causing the vocal cords to near each other in the middle line, in a relaxed state. This serious state of matters during respiration leaves only a narrow space, causing very harsh breathing, and probably asphyxia.

Paralysis of the ADDUCTORS, when one or both cords are seen at all times relaxed and drawn aside, leads in the latter case to complete want of voice, and in the former to aphonia more or less pronounced, but is not necessarily accompanied by much difficulty of breathing.

When these conditions remain long the muscles become atrophied.

These varieties of paralysis are recognised by the laryngoscope, and familiarity with this instrument is essential for pronouncing a diagnosis of laryngeal paralysis.

Treatment.—The pressure of an aneurysm or enlarged cervical or bronchial glands or other tumours on the nerve trunks renders treatment of little avail. It may be necessary to perform tracheotomy to avert for a time asphyxia. Electricity, from the nature of the case, in many instances could be of little use, if the cause is rightly apprehended, and reported cures are probably those of feigned, not real, disease.

Syphilitic Disease of the Larynx. — In the advanced stages of syphilis following upon a severe attack, the larynx may be seriously affected with tubercles or ulceration.

Symptoms.—The disease is associated with little pain, fever, or dyspnœa, but it is attended with hoarseness and loss of voice.

Treatment.—It yields to the syphilitic treatment by mercury mentioned at p. 99. The ulcers should be touched with strong solutions of nitrate of silver, or, if isolated, by the solid stick. Iodine inhalations are also beneficial.

LARYNGISMUS STRIDULUS

(*Synonyms*, Spasm of the Glottis, Spasmodic or Spurious Croup) is seen chiefly in rickety children of four months to two years.

Etiology.—It may originate from the brain, as in hydrocephalus; from direct irritation of the vagus or recurrent nerves; from tumours or enlarged thymus gland; from reflex causes, such as dentition, worms, improper feeding; or from fright or anger. It is essentially neurotic and non-inflammatory.

Symptoms.—The attack is sudden, usually occurring

at night and during sleep, and is characterised by one prominent symptom, dyspnœa. No air enters the glottis for the moment, and respiration seems to cease. The child struggles for breath, as if it were about to die from suffocation. There may be also convulsions and a contracted state of the flexor muscles of the thumb, fingers, and toes (carpo-pedal spasms).

The paroxysm ceases suddenly, but may be succeeded by others, and death sometimes takes place through suspended respiration, or by stagnation of the blood in the lungs, heart, or brain. The train may be laid for serious after-results, and although termed spurious croup, the disease is not free from peril.

IT IS CHIEFLY DISTINGUISHED FROM TRUE CROUP BY ITS SUDDEN ACCESSION AND SUDDEN DEPARTURE, BY THE FREEDOM OF BREATHING BETWEEN THE PAROXYSMS, AND BY THE ABSENCE OF FEVER, HOARSENESS, AND ANY ATTENDING COUGH OR INFLAMMATION.

Treatment.—During the paroxysm place the child in a warm bath, apply a sponge squeezed from hot water to the throat, and, after the infant is taken from the bath, or before it, sprinkle the face and chest with cold water. The cold sprinkling arrests the paroxysm for the time; if it fail to do so, chloroform should be inhaled; and to avert the recurrence of convulsions, should these be associated with the attack, bromide of potassium should be given combined with syrup of chloral (F. 69); or if there be no convulsions bromide of ammonium in a dose of three or four grains twice daily.

As further prophylactic remedies, adopt the treatment recommended in rickets; sunlight, fresh air, good food, cod-liver oil with syrup of the phosphate of iron. Regulation of the bowels is necessary, and lancing of the gums, if these be hot and tender, is also essential.

FALSE CROUP.—We think it advisable here to speak briefly of an affection of the air-passages attended with spasm of the glottis, but with the formation of no false membrane, and which has been termed Spasmodic Laryngitis or False Croup. It is preceded by some signs of

catarrh for a day or two, as evidenced by cough and hoarseness, and in the middle of the night the child affected wakes in great terror panting for breath. Each inspiration is accompanied by a loud crowing sound, and the cough is hoarse and barking. But the attack, though alarming, is not dangerous, and the paroxysms of coughing abate in half an hour or an hour or two hours, and the child falls asleep. For a night or two after this the symptoms may return, but not in such a severe form as in the first attack. Mothers speak of this disease when they say "their children are liable to croup." The *pathology* of this false croup is doubtful, but it most probably depends upon a slight catarrhal inflammation of the laryngeal mucous membrane, which is attended or complicated by spasm of the muscles of the glottis. There is no necessity for active *treatment*. An emetic of 60 minims of ipecacuanha wine, repeated every ten minutes until vomiting occurs, does good, and the application to the throat of a sponge squeezed out of hot water.

BRONCHITIS

is essentially an inflammatory affection of the bronchial mucous membrane, and may be either acute or chronic.

It is caused by exposure to cold or wet, local irritation from mechanical operations, *e.g.* needle-grinding, or it may be dependent on heart disease, or associated with various constitutional affections, such as rheumatism, gout, fever, Bright's disease. It is most common in childhood and old age.

Two varieties of acute bronchitis have been recognised.

1. When the larger and medium-sized air-tubes are alone affected.

2. When the inflammation does not stop there, but involves all the bronchial ramifications—capillary or general bronchitis.

The last form is rarely seen in adults, but chiefly among young children and old people, and is frequently fatal.

Certain general symptoms accompany both varieties. Thus, there are chilliness, fever, running at the eyes and nose, and general malaise. The extension of the inflammation down the respiratory tract causes irritation of the mucous membrane of the larynx and trachea, which is evidenced by a sense of tightness behind the sternum, and a tickling sensation about the windpipe. The expectoration is at first dry, and difficult to bring up, scanty, white, and frothy; but in the course of a few days, or a few hours, it increases in quantity; and if the attack be severe or prolonged, it becomes muco-purulent.

In the more severe form the symptoms, corresponding to the gravity of the case, are more urgent. The restlessness is great, the fever high, anxiety is depicted on the countenance, and the impaired and impeded circulation through the right side of the heart is evidenced by the livid lips; and this lividity sometimes extends over the body, and is observed at the finger ends. Should the disease terminate favourably, there is a gradual remission in the severity of the symptoms. The fever decreases. Respiration becomes easier, the cough less troublesome, and the expectoration freer. But if a fatal termination is likely, the symptoms increase in intensity. Unable to sit up in bed, the patient sinks exhausted on the pillow. The breathing is thus more difficult, and the lividity becomes more intense. There is not the power to bring up the mucus, which accumulates in the air-passages, and thus the patient dies from suffocation, or apnœa, due to the arrest of the circulation through the lungs in consequence of the coagulation of blood in the pulmonary arteries, and in the right cavities of the heart.

On auscultation during the first or dry stage of bronchitis we detect two coarse, rough, dry sounds all over the chest. The air-tubes are narrowed, but the air does not come through mucus: hence the dryness of the sounds, which are termed sonorous ronchi if the larger tubes are implicated, sibilant ronchi if the smaller ones are involved. Percussion in this stage is clear.

When the secretion of mucus commences, these dry

sounds are replaced by large bubbling in the larger air-tubes, or small bubbling if the disease has reached the smaller tubes. This has been termed the moist stage of bronchitis, and the sounds then heard have been technically called large and small crepitations.

Percussion may now sometimes detect dulness through œdema at the base of either lung; while, if there be pulmonary collapse through tenacious mucus plugging up a bronchial tube, as not unfrequently happens, the percussion note will lack resonance over that particular part.

Prognosis.—From one-half to three-fourths of those attacked with capillary bronchitis die between the sixth and tenth days of the disease. In favourable cases improvement commences from the fourth to the eighth day. Bronchitis affecting the larger air-tubes is not dangerous. Relief generally supervenes when expectoration becomes abundant. Should this be very deficient, pulmonary congestion ensues, and ultimately death. Circumstances increasing the gravity of the prognosis are very early or advanced life, the existence of some acute or chronic disease, or other complications.

Anatomical Appearances.—The morbid appearances directly indicating bronchitis as a distinct affection may be summed up in one word—redness, which may, however, vary in intensity. With the redness there is swelling, and at first dryness, of the mucous membrane. The dryness is afterwards replaced by a muco-purulent secretion.

Treatment.—It is not easy to lay down any general rule for the treatment of acute bronchitis. Yet it may be said that in the early catarrhal stage, when the large tubes only are affected, the administration of a full dose of opium (in wine or whey) or of quinine with the application of jacket poultices of linseed meal often checks the disease. If the fever be intense and if the inflammation has extended, then small doses of vinum ipecacuanhae, frequently repeated, are serviceable in rendering the mucous membrane moister. The application also of

hot flannels sprinkled with turpentine to the throat and upper part of the chest, or mustard poultices, give marked relief. The patient should be kept in bed and the temperature of the room maintained at 65° F. But if the case be one of capillary bronchitis, more energetic measures are necessary. Vinum antimoniale is the best medicinal agent in many cases, and should be given in expectorant and diaphoretic doses until diaphoresis sets in and the expectoration becomes freer, when its administration should be stopped and replaced by carbonate of ammonium with tincture of squill and infusion of senega. There are, however, other cases where a depressing remedy is inadmissible and cardiac stimulants from the first form the only chance of averting a fatal issue. Of these the administration of turpentine in extreme cases seems to afford the only chance of arresting a fatal result, and it should then be given in alternate doses with champagne. Mustard or turpentine must be applied locally until the surface is thoroughly reddened.

A moist state of the air round the patient is of great importance, and for this purpose a kettle on the fire with a long tube throwing steam out near the bed suits better than anything else. Ipecacuan spray acting directly on the lungs also gives much relief. It is to be noted that the temperature of the room should be kept at a constant level, for a fall of a few degrees, in a room saturated with moisture, will occasion a chill which may be fatal to the patient.

If the disease progresses favourably, the steam and the spray should be stopped and the mixture of carbonate of ammonium previously mentioned ordered.

Dietetics. — The diet should be fluid. In ordinary cases, milk, beef-tea, arrowroot, and gruel are sufficient, but in capillary bronchitis of young and old persons it is necessary to add wine or brandy in accordance with the rules mentioned under broncho-pneumonia at p. 223.

CHRONIC BRONCHITIS

sometimes follows the acute form, or is the result of general bad health, or the sequela of what are termed coughs and colds. It is common in advanced life, appearing in wintry inclement weather, and disappearing in summer. It may vary in its severity, at times being attended with little or no uneasiness except a slight cough and some expectoration ; in other cases the cough is very harassing, especially in the morning, the expectoration copious and resembling very much the nummular sputa of phthisis, or it may simply be frothy and muco-purulent. Fresh exposure to cold or atmospheric changes may at any time convert chronic into a dangerous form of acute bronchitis.

Chronic bronchitis is sometimes dependent on certain constitutional diseases, as syphilis, gout, rheumatism. It also specially affects workers at certain occupations ; *e.g.* knife-grinders, miners, cotton operatives, etc. Auscultation after free expectoration reveals loud harsh sounds all over the chest. These are best described as snoring. They vary in their intensity according as the air-passages are well cleared from mucus, or the reverse. In advanced cases the respiration is of a hollow blowing character, and attended with gurgling. Percussion is unaltered unless there is great accumulation of matter to be expectorated, when it may be temporarily dull over a particular spot. As the disease advances chronic bronchitis is associated with emphysema, with all its consequent symptoms ; for, dependent on an impeded pulmonary circulation, dyspnœa becomes a pronounced symptom. Further, the pulmonic obstruction causes venous congestion, and dilatation of the right ventricle with tricuspid insufficiency, and on these follows the whole train of symptoms characteristic of general passive hyperæmia.

Bronchiectasis.—Sometimes, as the result of various chronic lung affections—as bronchitis, emphysema, or

interstitial pneumonia—a bronchial tube may become so dilated as to form a single pouch, like an aneurysm of an artery, or a series of pouches in the same tube. This condition is termed Bronchiectasis, and if the cavity is near the surface, is surrounded by condensed lung, and contains air as well as liquid, the signs will be identical with those of a phthisical cavity, and can only be distinguished from it by the fact that such dilatations are usually found in the middle and lower parts and not at the apices of the lung; by the absence of bacilli in the expectoration, which is abundant and fœtid, and by the breath being very offensive.

Plastic Bronchitis.—A peculiar form of bronchitis, occurring either in an acute or chronic form, but much more frequently in the latter, is called variously "croupous," "plastic," or "fibrinous." It is very rare, and occurs more frequently in males than in females, between the tenth and the thirtieth years of life. It is attended with the ordinary symptoms of bronchitis, and has only one certain diagnostic sign, THE EXPECTORATION OF BRANCHING BRONCHIAL CASTS. Recovery in the chronic form is the rule, although the disease is apt to recur.

Treatment of Chronic Bronchitis.—Indications for treatment vary according to the different forms of Chronic Bronchitis, but, in all cases, are based on certain obvious principles. The patient should always be well clad, flannel being constantly worn, and he should be exposed as little as possible to the vicissitudes of the weather. During winter, if circumstances admit, the patient should reside where the climate is mild and dry. In addition, an attempt must be made to relieve the cough, to promote or restrain free expectoration, and subdue spasm. In slight cases with little cough and free expectoration, soothing expectorants, as Tinct. Camph. Co., Syr. of Tolu and Mist. Ammoniaci may be ordered (F. 43), or inhalations consisting of medium solutions of alum or tannin, either alone or with common salt.

In cases where the cough is *considerable* and the ex-

pectoration *scanty* astringent medicines would only increase the distress, and hence it is advisable to order remedies which will promote liquefaction of the mucus and moisten the dry mucous membrane. Carbonate of Ammonium is here specially useful, not merely for its action on the bronchial tubes, but for its general influence on the system. About 45 grains should be given in twenty-four hours; a convenient method being six grains every three hours, with 10 minims of Sp. Chloroformi, and 30 minims of syrup in one ounce of camphor water. Perspiration and an increased flow of urine are thus induced with relief of the dyspnœa and liquefaction of the expectoration. Iodide of Potassium also does good service in making the expectoration more free.

In *checking the expectoration* when excessive, Tincture of Benzoin or Dilute Sulphuric Acid and other preparations may be employed (F. 21). Inhalations of steam, alone, or charged with hops or with dilute hydrocyanic acid or pine oil, are serviceable in moderating *cough* and *spasm*. Nitro-glycerine internally or the nitrite of amyl inhaled also alleviates the dyspnœa. In chronic bronchitis German authorities speak highly of compressed or rarefied air. Waldenburg has invented a machine for the purpose of making the patient inspire compressed air or expire into rarefied air. The directions being that compressed air should be inspired for five, ten, or fifteen minutes, and then after a pause, that expiration into rarefied air should be practised for a similar period. The range of additional or diminished pressure seldom exceeds $\frac{1}{40}$ or $\frac{1}{30}$ of an atmosphere, and in some instances is not more than $\frac{1}{60}$ or even $\frac{1}{120}$ of an atmosphere. The effect of this mode of treatment is progressive retraction of the pulmonary tissue, increased elasticity of the lungs, diminished frequency of respiration, less engorgement of blood in the venous system, and in consequence disappearance of œdema, if that has begun.

The treatment for *bronchiectasis* consists in disinfecting the secretions which are formed in the bronchiectatic cavities and in promoting their discharge. For destroying

offensive secretions and for diminishing the constant state of irritation so produced, Skoda recommended inhalations of oil of turpentine. Energetic fits of coughing are produced by its action, and consequent dislodgment of the secretions formed in the cavities. When the secretions become less offensive the turpentine inhalations may be replaced by solutions of 3 per cent of alum and tannin, and these inhalations must be persevered with for a considerable period. In *Fibrinous Bronchitis* emetics are indicated after hot inhalations, to remove the branching casts in the bronchi. Iodide of potassium is also specially serviceable for this, as the casts are said to become loose even on the second day of its administration. There is no remedy as yet known which will prevent its recurrence.

Climatic and Dietetic Treatment.—The health resorts of Bournemouth, Penzance, Torquay, and the Isle of Wight are useful in winter for chronic bronchitis; so also are Cannes, Hyères, Mentone, Meran, and Madeira. The inhalations of the waters of Ems and Lippspringe can also be highly recommended. The food taken should be light and easily digestible. Heavy meals should be avoided, and in patients with this disease who are inclined to obesity, the treatment recommended for obesity should be adopted (p. 109). The bowels should be carefully regulated by dietetic remedies, as stewed prunes or figs and brown bread, or by mild laxatives as Carlsbad Salts or Hunyadi Janos water.

EMPHYSEMA

In forming a conception of the nature of Emphysema we think it advisable to look first at the condition of the lungs as seen in the dead body of a person who has been emphysematous. We recognise its presence by observing that the lungs are not collapsed when the chest is opened. They appear like down pillows to fill the thorax and overlap the heart. We observe the apices above the clavicles and their bases bulge on the diaphragm, so that instead of being arched upwards, it has a flattened surface.

We touch the lung and we find it has a peculiar soft feel; if we squeeze it between the finger and thumb it does not crepitate; and if we make pressure on its surface a deep pit is left when the pressure is removed. The impression received from such observations is that the lungs have lost their elasticity, and that they are bloodless; and this impression is not removed but confirmed by a close examination. We find that the air vesicles are dilated, that the alveolar walls are wasted, that the capillary blood-vessels which are distributed on the walls of the air vesicles are shrunken from the pressure of the vesicular dilatation, while the larger interlobular vessels are thickened and distended with blood. In the description given we have had to do with hypertrophous emphysema, and in contradistinction to this hypertrophous form we have another which is termed atrophous or "senile." The lungs are smaller than natural. They do not fill the thorax after death; on the contrary, they collapse quickly when the thorax is opened. If we examine such lungs we find that the change is essentially senile, that there is atrophy of the several structures of which the air vesicles are composed, and that several of the vesicles are thrown into one.

Etiology.—The cause of this atrophous form of emphysema is thus easily understood, but in Hypertrophous Emphysema we come to debatable ground, which centres round an inspiratory or expiratory cause.

We can better understand the reasoning on which a decision is based in favour of the expiratory theory by comparing healthy breathing with what happens when forced expirations are made. In quiet healthy expiration an escape of air occurs into the bronchi from all the lobes alike without muscular contraction, and is due to the contractility of the lung, the weight of the thoracic wall, and the elasticity of the intestinal gases and the abdominal muscles; whilst, on the other hand, in forced expiration the auxiliary expiratory muscles, which, however, do not extend above the fifth rib, are also brought into action. In case the glottis is closed

the air within the chest is thus subjected to an increased pressure, which bears upon the alveolar walls in all directions. To this increased pressure the thoracic walls exercise counter-pressure, and it is precisely where this counter-pressure does not exist—viz. at the apices, the alveoli of the anterior margin of each lung, the margin at the base of the lung, the part of the lung near its root below the entrance of the bronchus—that emphysema forms. These parts of the lungs are destitute of the support afforded by the thoracic walls and by the contracted expiratory muscles. They are the weak parts in the shield of defence, and they give way when the assault is made. Doubtless mal-nutrition of the lung tissue assists this development of emphysema, and although the precise structural changes occurring from this are not satisfactorily determined, yet their existence and significance cannot be ignored.

Symptoms.—As a rule repeated winter cough, or bronchial catarrh accompanied by little expectoration, precedes emphysema. This catarrh lasts through the winter and disappears during summer. Chronic bronchitis cannot exist long without being associated more or less with emphysema, so that it is impossible to separate the effects of the two lesions (Fagge). In some cases emphysema appears to be more rapidly developed with some other disease of the respiratory tract, as hooping-cough or pneumonia; or dyspnœa may be the first prominent symptom, followed by cough and further evidences of emphysema, as in severe straining of the respiratory organs in connection with certain occupations, as playing on wind instruments or lifting heavy weights, or it may be hereditary. In the two latter forms many years may be passed without much annoyance, until, as time advances, gradual occurrence of shortness of breath attracts the attention of the patient, and advice is sought. In the higher grades of the affection a physical examination brings out important points. The thorax is sometimes enlarged in all its dimensions, but most commonly the enlargement is but partial, and it particularly involves

the upper and middle portions; whilst the lower part is either *contracted*, *normal*, or rarely somewhat *enlarged* (the barrel-shaped thorax). The gait is stooping, the intercostal spaces are wide and flat, and the muscles flabby. The pulmonary boundaries are enlarged, and the liver occupies a relatively lower position. There is a diminished area of cardiac dulness, with epigastric pulsation and lack of the apex beat. Auscultation shows the inspiration as short and quick, the expiration prolonged and *wheezing*; percussion reveals exaggerated resonance or dull tympanicity (Gairdner). The countenance is livid and cyanotic, the nostrils are dilated, and the voice is feeble.

The course of the disease in a typical case described goes on from bad to worse; the symptoms become aggravated, often from bronchial catarrh or by the supervention of asthma; sometimes by indigestion, causing flatus and the pushing upwards of the diaphragm. There are also great wasting and marked debility; the circulation becomes embarrassed with or without valvular disease: more or less venous congestion is apparent, ending in general dropsy, and ultimately in exhaustion and death.

Prognosis.—When of acute origin, resulting from hooping-cough or strain, recovery may take place, but in other cases there is no probability of a recovery; for the distended and bloodless vesicles can never regain their shape or natural structure. The duration and the intensity of the disease depend much on the surroundings and circumstances of the patient, and if these are favourable fairly good health may be maintained for some years.

Treatment.—The therapeutic, hygienic, and climatic treatment alluded to under Chronic Bronchitis is in the main applicable to emphysema (p. 204). In addition may be mentioned arsenic internally or in the form of Trousseau's cigarette; hypophosphites (F. 82); Easton's syrup; iodide of potassium (F. 5). The injection of apomorphine in some cases where I tried it acted well. Free vomiting occurred in about ten minutes, which was

succeeded by gentle perspiration and refreshing sleep. When the circulation is disturbed and dropsy appears, the use of digitalis is attended with good results, alone or with other diuretics, as in (40*a*).

ASTHMA

The symptoms of a case of spasmodic asthma are very characteristic. The patient, male or female, about middle life, or at an earlier age, retires to rest at night and sleeps for two or three hours. On awakening there is dyspnœa; the breathing is difficult but not hurried, and is accompanied by great wheezing. The normal relations between inspiration and expiration are reversed; for the expiration lasts two or three times as long as the inspiration. The chest is expanded, the diaphragm unduly low, and the percussion note is markedly resonant. Auscultation is typically dry; hard, snoring, wheezing, and whistling sounds displacing each other in different parts of the chest, with disappearance and return at the point of auscultation. The extremities are cold, the face livid, and the expression pained and anxious. The pulse is small and quick, but there is no increase of temperature. The patient feels that if expectoration occurred freedom from dyspnœa would be secured, but in a case unaided by treatment this relief is only obtained at the end of the paroxysm, which may last from one to two hours, the accompanying expectoration consisting of frothy mucus free from blood or pus. The whole train of symptoms, so sudden and so severe, indicates no congestion, but rather spasmodic contraction of the muscular fibres of the bronchial tubes, and this view is generally entertained as the proper explanation of the phenomena of asthma.

Etiology.—The causes are direct and indirect. I. Direct. The exciting cause frequently acts directly on the pulmonary mucous membrane. Thus irritating inhalations and a damp condition of the atmosphere presumably operate. Errors of diet may possibly also act

directly; thus a heavy supper may lead to distension of the stomach and pressure on the diaphragm; if so, those predisposed to asthma awake after the first sleep with the characteristic paroxysms. It is more likely, however, that dietary excess operates indirectly. II. Indirect. The action may be through the *nervous system*. Thus may be explained attacks, the result of strong emotion of joy or sorrow, fright, etc. etc. The so-called "dietetic effects" occurring after over-indulgence in food, especially taken late in the evening, may be explained by nervous agencies —afferent impulses travelling through the gastric branches of the vagus and being reflected at the medulla through its pulmonary offsets. Again, the action may be through the *medium of the blood*. This may account for the curious relations between diseases of the skin and asthma, though some prefer to consider this also due to nervous influences. *Heredity* is a powerful indirect cause, and may be traced in about one-half of the cases met with. Sometimes asthma, instead of being idiopathic or spasmodic, is symptomatic of other chest affections, as chronic bronchitis, emphysema, or heart disease. It may then be termed symptomatic or organic.

Prognosis.—Patients habitually asthmatic are thin and round-shouldered, and may enjoy fair health when they regulate carefully their diet, and do not expose themselves to unfavourable atmospheric conditions. Spasmodic asthma is not attended with danger to life, the patient suffering from this type of the disease being usually long-lived; but when asthma is organic, complicated with the other chest affections mentioned, the prognosis is grave.

Treatment.—The treatment to be adopted is based on efforts to relieve the paroxysm by promoting expectoration. The nitrites, naturally from their action on the blood-vessels, are suggestive of benefit; and it is found that the inhalation of nitrite of amyl is attended with satisfactory results,—a few minims being inhaled during fifty seconds give instantaneous but no permanent relief. A much more prolonged action is secured by the introduc-

tion of nitrites into the stomach, and in this way nitrite of amyl or nitrite of sodium may be given, or nitro-glycerine. Convenience of administration shows that of the remedies mentioned nitrite of sodium or nitro-glycerine is to be preferred. They are both extremely stable, and can be readily given either in solution or by subcutaneous injection.

All observers of asthma note, however, that it is advisable occasionally to change the treatment, and other remedies than those mentioned must not be overlooked, for their effects have been watched and favourably reported on by experienced men. Notably among these stands stramonium, the powder of which may be wrapped in cigarette form and smoked, or the powder may be combined with lobelia, nitrate of potassium, of each one ounce, and black tea, two ounces. Complete powdering of these ingredients is secured by half an hour's hard work with pestle and mortar. Half a teaspoonful of this should be placed on a plate and ignited. The fumes are inhaled by the patient, and frequently cause immediate relief by relaxation of the spasm and free expectoration.

Iodide of potassium in five-grain doses thrice daily is a favourite drug, either alone or combined with tinct. scillæ m. x., tinct. lobeliæ m. xv., liq. morphinæ hydrochlor. m. xii.; occasionally doses of the iodide, to the extent even of gr. xxx. to gr. xl., have been given with benefit. In some cases iodide of sodium acts better than iodide of potassium. Niemeyer favours quinine, if the seizures are regular and frequent; if irregular and at long intervals he prefers metallic nervine remedies. Of these may be mentioned as specially entitled to confidence saccharated carbonate of iron, oxide of zinc, and arsenious acid; or in bad cases nitrate of silver.

In asthma with profuse expectoration (humid asthma) injections of pilocarpine have been highly recommended; and in asthma with disease of the heart a hypodermic injection of morphine alone or combined with atropine is useful.

The fact that asthmatics are frequently benefited by

fog and murky conditions of the atmosphere, which aggravate other bronchial affections, suggests specially in this disease a change of air. Thus if the asthmatic patient usually lives in the town he may try the country, or *vice versâ*. Personally I have seen asthmatic patients in Glasgow enjoy exceptional health during the fogs of frosty weather, while, on the other hand, when the winter was open and damp they suffered intensely.

Climatic Treatment.—Bournemouth and the Isle of Wight in this country are advisable as winter residences for asthmatics. On the continent, Amelie-les-Bains, Axenstein, Lippspringe, Montreux, and St. Andreasberg. In America, Colorado Springs or Denver.

Hay Asthma or Hay Fever.—This is a peculiar affection, distinguished by a catarrh of the eyes, nose, mouth, pharynx, and larynx, which varies in severity. It is observed more often in the town than the country, in a temperate than tropical climate, and chooses, according to Sir Andrew Clark, the "Anglo-Saxon before all other races." In the evolution of hay fever the same authority states there are three factors concerned—(1) The nervous constitution; (2) the irritable local state; (3) the outward exciting cause.

(1) The nervous constitution is sometimes inherited, sometimes acquired, but generally speaking hay fever appears to come with civilisation, and to be more prevalent among highly cultured than ignorant people.

(2) The irritable local state involves the mucous, vascular, lymphatic, and cellular constituents of the parts affected, and when the irritability is excessive almost any local cause—as odours, dust, touch, light, heat—will serve as exciting agents.

(3) Undoubtedly the chief outward exciting cause is the inhalation of the pollen of various plants (chiefly of the graminaceæ) abundant during the hay season. But the fact that the disease occurs at other times than at the hay season, and that it is an affection more common in the town than in the country, induces the belief that

local irritants, as mentioned previously, may prove exciting factors when there is irritability of the nasal mucous membrane.

Symptoms.—The first symptom is itching of the nose, hard palate and fauces, and eyes, which is followed by violent fits of sneezing and running from the eyes and nose. The submucous tissue of the nares is affected, and the nostrils become blocked up, the discharge from them ceasing. Slight febricula is also present, the pulse being about 110. With the catarrhal symptoms there is sometimes considerable asthma, revealed by tightness of the chest, difficulty of breathing, wheezing, prolonged expiration, followed at the conclusion of the attack by expectoration.

As a rule the liability to the attacks lasts from three to four weeks in summer. There are no complications.

Diagnosis.—From cold in the head by its appearance in summer. From asthma by the catarrh which is usually unknown in ordinary asthma.

Treatment is local and constitutional. Of local remedies cocaine occupies a foremost place. It may be used in a solution applied to the interior of the nose, as a 5 to 15 per cent solution, with a laryngeal brush; or cocaine bougies may be inserted, containing each $\frac{1}{4}$ to 1 grain of the drug. Other local remedies are glycerinum acidi carbolici ℥i, quininæ sulphas ʒi, together with $\frac{1}{2000}$ of its weight of perchloride of mercury; or tannic acid in a solution of 4 grains to the ounce of water. The brush dipped in the solutions mentioned should be passed up the nostrils, then withdrawn, recharged and reapplied. Both nostrils should thus be treated. With the carbolic solution there follows sometimes considerable irritation, with swelling of the nose and increase of fever, and of this the patient should be informed. The length of the interval between the applications depends on the effect produced. Generally two or three are sufficient.

The constitutional treatment consists in a liberal diet, exercise, and attention to the functions of the bowels and skin, with a nervine tonic (F. 80). If circumstances

admit of a change of residence, this should be advised, preferably to the sea-side, where the prevailing winds are from the sea, not the land.

PNEUMONIA

Acute inflammation of the substance of the lung is best recognised, probably, from its clinical history.

The disease is initiated from exposure to cold, or from the inhalation of solid irritant particles or gases. These causes in the disease in question operate on the chest, with symptoms of fever, preceded by shivering, and accompanied by gastric disorder, sometimes assuming the form of jaundice. Then the breathing becomes accelerated, although not laborious, and there is a cough, this cough causing pain, which is referred to the chest, and, as a rule, to that particular part of it which is affected. After a varying interval, the cough, which at first was hard, becomes softer, and a tough tenacious sputum is expectorated. This sputum is considered, and justly considered, characteristic of the disease. It varies at the different stages of the disease. At the onset it is very scanty, of a whitish colour, and studded here and there with blood. Later on, and in some cases shortly after the initial chill, it assumes a *characteristic rusty tinge.* At this period it is viscid and clings to the side of the vessel into which it has been expectorated. Occasionally at this stage the sputum is not rusty, but grass-green. As the disease progresses the sputum becomes more abundant and thin, and its colour changes from brownish-red to a saffron or citron yellow. Fibrinous coagula are also observed, but as the disease tends towards recovery the fibrinous coagula disappear, and the colour of the sputum is similar to that observed in chronic bronchitis. The question of a distinct microbe in pneumonia is discussed at page 29, and as there indicated the sum of our knowledge at present is not satisfactory. Several distinct microbes are observed, and although a

diplococcus is most commonly seen, we are not warranted from a diagnostic point of view in considering it peculiar to pneumonia, as the same organism may be detected in cases of chronic bronchitis and bronchiectasis. The temperature may reach 105° F.; or there may be typhoid symptoms, with debility, dry tongue, or delirium—so much so that the affection may be mistaken for typhus fever. The pulse is frequent, and hard at first. A herpetic eruption frequently appears on the lips or nostrils about the acme of the fever.[1]

Such are the general outward signs of pneumonia. What is going on inside? In answer to this it may be stated that the disease has been divided into three stages, which it is well to be familiar with, although it is absurd to suppose that they follow one another with mathematical precision. In the FIRST STAGE, if an opportunity was afforded of examining the organ attacked with inflammation, the characteristic appearance of the part involved would be redness, with a quantity of red frothy serum escaping on section. The elasticity and sponginess of the lung are diminished, but it will still float in water, for the vesicles contain fluid and air.

In the SECOND STAGE the redness has yielded to solidification. The part affected has a thick heavy consistence. It no longer crepitates when pressed, and if thrown into water it sinks. Pressed between finger and thumb it breaks down, and from the appearance being like that of liver tissue it has been termed "red hepatisation." Here the fluid in the vesicles has coagulated.

In the THIRD STAGE resolution is taking place in the majority of cases, and the lung is coming back to its primary condition. When cut into, a great quantity of reddish or grayish fluid oozes out. Hence some call this "gray hepatisation." This stage may, however, be carried farther into diffuse suppuration, and sometimes, though rarely, into abscess and gangrene.

The change from the first to the second stage goes on

[1] This herpetic eruption is, in my experience, always a favourable sign. Nurses term it the "breaking out of the cold."

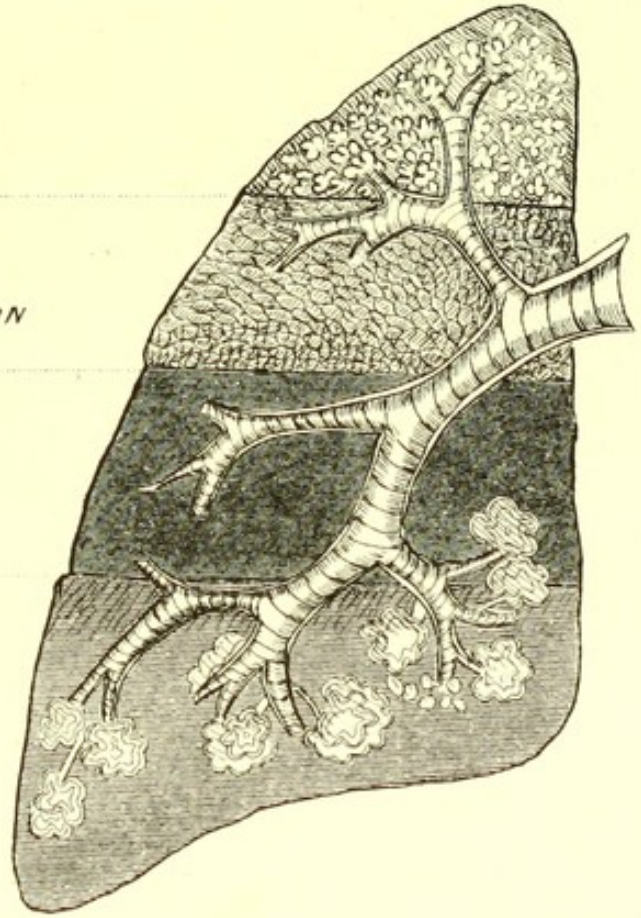
PNEUMONIA.

Normal Lung.

1ST STAGE: ENGORGEMENT.
CREPITATION HEARD ON INSPIRATION

2ND STAGE: COMPLETE DULNESS.
TUBULAR BREATHING.

3RD STAGE: RESOLUTION.
CREPITATION HEARD ON
INSPIRATION AND EXPIRATION.



rapidly, twenty-four hours or even less being sufficient. It must also be remembered that we may have one part of the lung in the first, another in the second, and another in the third stage, so that the auscultatory phenomena, which come now to be considered, will be found to vary at different sites. The accompanying engraving is intended to show the three different stages of pneumonia, while the upper part is unattacked by inflammation. On applying the stethoscope over an inflamed lung, the healthy vesicular sound may in part be heard, with the addition of minute crepitation during inspiration. What is this due to? Very probably it is formed in the minute space of the bronchial terminations and pulmonary vesicles; and by some is considered due to the bubbling of air through the liquid in the vesicles, and by others to the forcible separation of the walls of the vesicles glued together by exudation, and yielding to the inspired air; the sound is best realised by rubbing a lock of hair in the immediate vicinity of the ear or throwing salt on a fire.

In the second stage, over the part where the lung has become dense and solid, neither the vesicular murmurs nor the minute crepitation are heard, but there are other sounds probably—viz. bronchial respiration or tubular breathing. This is due to the fact that there is entering the condensed mass a permeable bronchus, and the sound is conveyed along the solid conducting medium. So, also, there may be no bronchial respiration, and no breath-sounds at all heard, because the bronchi may be filled up with accumulated secretion. Sometimes this may be set free by a cough, and the bronchial respiration may be established. Ask the person to speak while the stethoscope is applied over the site of the solidified lung, and the voice sounds will be conducted to the ear in an intensified manner, and hence the name "bronchophony." Similarly the vocal fremitus will be increased. On percussing the same part, it can also be easily understood how distinct dulness will be elicited.

In the third stage moist sounds are detected, for the

lung is permitting the air again to enter. It is the first stage on a larger and coarser scale, because the crepitations are heard both during inspiration and expiration. It has been termed *crepitatio redux*, or more commonly *crepitus redux*; and it is usually a happy sign in pneumonia, since it indicates that the lung is returning to its duty, permitting the air to re-enter its wonted seat. It does not come on at once, neither does it invade the whole lung at once; and at last, as health is established, it is replaced by the healthy vesicular murmur, if resolution has been thoroughly progressing.

In pneumonia the right lung is more frequently attacked than the left, and the site of the inflammation is usually at the base; hence the back and not the front is the proper place for hearing the phenomena indicated. Pneumonia is sometimes double. If it is not, the healthy lung, requiring to act with increased force, renders the respiration "puerile." The urine in pneumonia during the stage of hepatisation shows a marked diminution or even entire absence of chlorides. These reappear as the inflammation subsides. It is frequently scanty, high-coloured, and tends to deposit urates. The average duration of the disease in uncomplicated cases is seventeen days; when complicated, about twenty-one.

Gangrene.—Should the inflammation end in gangrene, there will be an intense fœtid smell of the breath, great prostration, dyspnœa, and hectic fever; and a fatal result unless the part involved is very small. Gangrene may also result from obstruction of vessels, from embolism, various septic poisons, and (it is also said) from nervous influences, also in course of acute fevers.

A certain amount of bronchitis must always accompany acute pneumonia (broncho-pneumonia); very often also pleurisy, when the disease is termed pleuro-pneumonia.

Broncho-Pneumonia (Catarrhal Pneumonia).—This form of pneumonia is always associated with and generally preceded by inflammation of the bronchial tubes. It is most common in children, rarely seen in adults, and only

occasionally observed in old age. Attacking thus the extremes of age, it is a disease of great gravity, and statistics show that in children two-thirds of the cases end fatally, and when it occurs in old age the chance of recovery is not great unless the patient has had, previous to the illness, uninterrupted good health.

Without entering upon too minute divisions, we may say that broncho-pneumonia is generally a secondary affection, and if we consider it as this, we can understand what changes may occur in the lungs of those affected. We have inflammation of the smaller bronchi, and this may extend to the air vesicles; or we may have obstruction of a bronchial tube, with collapse of the air vesicles in connection with it. As the result of this congestion increased cell-formation takes place, going on to fatty degeneration, which changes the appearance from a reddish-gray to a yellowish colour. This fatty change may lead to resolution and absorption, but if this be not completed, the masses break down and form a suitable nidus for the development of the tubercle bacillus. On section therefore of lungs in a recent case of broncho-pneumonia, it will be understood how the most prominent features are swelling of the lining membrane of the bronchial tubes, and congestion of the vesicles to which they lead. If the inflammatory process has extended to the vesicles, this will be manifested by small patches of consolidated reddish-gray ill-defined nodules studding the structure of the lungs and varying in size from a hemp seed to an egg. The interlobular divisions, however, remain distinct, and the consolidation thus limited presents a marked contrast to that observed in the ordinary form of lobar pneumonia.

Symptoms.—The pathological changes mentioned lead us to understand the characters of this disease. An increase of fever supervenes on a cold or bronchial catarrh from which a child has been suffering for a few days, the pulse becomes rapid, and the temperature may rise as high as 104°. The breathing is laboured, increasing to considerable dyspnœa, and the nostrils are generally

dilated with each inspiration. There is much restlessness and occasionally convulsions. The sounds heard on auscultation are similar to those noticed in acute bronchitis when it attacks the smaller air tubes (p. 200). Percussion indicates no dulness, unless centres of inflammation have coalesced, when areas of dulness may be here and there detected. The cough is hard and attended with no expectoration. Strength is rapidly lost, and in bad cases the inspirations become so feeble as to cause a condition approaching suffocation to set in. Before this serious symptom appears, the disease may be arrested and steady and complete recovery ensue, with, however, a tendency to relapses if due care be not taken.

When broncho-pneumonia appears in the course of hooping-cough or the infectious fevers, the fever is less severe, and the condition less intense. The course of the disease is, however, more prolonged, and recovery is slow. In broncho-pneumonia of the aged there is at times some expectoration, but its colour is not rusty as in lobar pneumonia.

Chronic Pneumonia (Cirrhosis of the Lung).—This form of lung disease, by some called interstitial pneumonia, is rarely a primary affection, but is dependent on previous inflammation. The connective tissue of the lung becomes increased and hardened, the calibre of the air-cells is diminished and replaced by the fibroid growth. This change may follow on an unresolved pneumonia of the lobar form previously mentioned, or it may attend chronic phthisis or bronchitis. A lung which is the seat of fully-developed chronic pneumonia is diminished in size, solid, and hard to the touch, and when cut, it presents a smooth shining appearance, and gives a creaking sound under the knife. The *symptoms* are, retraction of chest on affected side, dulness on percussion, tubular breathing with, in advanced cases, bubbling râles, heart's impulse shifted to affected side.

Prognosis.—Lobar pneumonia occurring in the young or very old is attended with great danger. An unfavour-

able prognosis must also be given when it is double, when the temperature is above 104° F., when the pulse becomes weak, and when the patient has been addicted to drinking habits, and becomes delirious in the course of the disease. Although the pneumonia, *per se*, may terminate favourably, yet through its not resolving properly, or other circumstances, phthisis may supervene. In broncho-pneumonia the prognosis depends entirely on the circumstances attending the development; when it occurs with measles or hooping-cough, the prognosis is favourable. But with scarlatina and a temperature above 105° F. it is very unfavourable, especially if there are also a feeble pulse and a tendency to coma. In chronic pneumonia the prognosis as to time is good, as people with it may live for many years, and suffer only from dyspnœa. Any intercurrent affection will, however, have a direct influence on the prognosis of a disease which can scarcely be regarded as an independent affection.

Treatment.—Formerly the treatment of pneumonia in its early stage was blood-letting. In late years this has been abandoned, because it was observed that if venesection failed to cut the attack short, it left the patient more unfit to cope with the course of the disease through the stages of consolidation and resolution.

Yet if the case be seen at the early stage, and if the patient be a strong robust man, there can be little doubt that modified blood-letting should be tried. The application of six to eight leeches to the affected side notably relieves pain and makes the breathing more easy. Many medicinal agents have been extolled as tending to abate the inflammatory process, especially tartar emetic, aconite, quinine, or antipyrin. My experience leads me to speak most favourably of the first given in the form of antimonial wine. It is a potent cardiac sedative, and its action is also directed to the respiratory system—an action which none of the other remedies possess. This twofold action gives ease to the lung, by moderating the circulation and by rendering moister the bronchial ramifications. It gives rest, and acts thus as a splint

does to a limb that has been fractured. Its adoption does not necessitate large and nauseating doses, for its beneficial influence as a diaphoretic and expectorant will be exerted by giving every two hours a dose of $\frac{1}{8}$ of a grain or 25 to 30 drops of the wine.

Thus	℞. Vin. antimon.	℥v.	
	Sp. chloroform.	ʒvi.	
	Aq. camphor.	ad ℥vi.	M.

S. A tablespoonful every two hours.

In the course of twenty-four or forty-eight hours the pulse will be softer, the temperature lowered, the skin bathed in perspiration, and the expectoration freer. The remedy has now accomplished its end, and it may be discontinued or given in the same dose at an interval of six instead of two hours for two days, or preferably vinum ipecacuanhæ should be substituted for it in a dose of sixty minims every four hours. Afterwards a stimulant expectorant should be ordered (F. 44).

If the case be not seen in the early stage, if the disease has advanced to the stage of consolidation, then the use of antimony is interdicted, and an expectorant mixture (F. 44) should be prescribed, and nature's efforts aided in every way to promote recovery. Stimulants at the stage of the crisis are thus generally necessary, and carbonate of ammonium.

The application of ice to the chest has the support of continental and some home authorities, but in this country reliance is placed more upon the application of hot poultices of linseed meal. Their careful and continued use affords marked relief. They promote comfort and assist expectoration. Sleep in some cases must be secured by a hypnotic, and to obtain this without interfering with the progress of the disease chloralamid in a dose of twenty to thirty grains appears to be better than any preparation of opium, as its action does not materially influence the breathing or the circulation. Bromide of potassium in a dose of thirty grains is also valuable, but its action is not so certain as that of chloralamid.

Dietetics.—In severe cases of pneumonia the appetite from the beginning of the attack is lost, in less acute attacks this is also apparent though not so marked. Acting on the hint of nature, the diet should at first be non-stimulating and spare, and should consist of soups, milk, and eggs. When the disease has advanced to the second stage, it requires to be more nourishing, and chicken jelly or well-made beef-tea fulfils this object. At intervals pieces of raw meat cut up small and seasoned with salt and pepper should be ordered, unless there be a distinct aversion to this form of nutriment. Ice and iced drinks are grateful.

Circumstances and the exigencies of the case must decide when stimulants are requisite. In the majority of cases they are essential on the fifth or sixth day of the attack, and they should be administered in small doses at regular intervals. If the patient has been accustomed to the daily use of stimulants it is often necessary to order them earlier than the time mentioned, and in every case where the patient's habits have been intemperate they should be given all through the disease, as it may be that only by their administration will a fatal issue be averted.

When consolidation has not entirely disappeared, it is advisable to order a change of climate, and for this purpose Ventnor, Falmouth, Cannes, or Mentone can be recommended.

In *Broncho-pneumonia* a uniform moist atmosphere of 62° by means of steam should be maintained in the bedroom, and linseed meal poultices should be applied to the back and front of the chest. Castor oil should be given and a diaphoretic mixture as F. 31; to which, proportionate to the age, a few drops of ipecacuanha wine should be added. When the skin acts freely it is advisable to order a stimulating expectorant, as ammonia and senega, to dislodge the bronchial secretion. If exhaustion is extreme, brandy $\frac{1}{2}$ to 1 oz. in divided doses should be given to a child in twenty-four hours. If the fever be high and lividity marked, the child should be placed in a bath of 77° to 86° F., and cold water should

be poured over the head and chest. Venesection to 3 oz. does good when the venous congestion is extreme. *Diet.*—Milk and farinaceous food should be administered in small quantities at short intervals. In the treatment of *chronic pneumonia* remedies must be given for the relief of the different symptoms similar to those recommended in chronic bronchitis or phthisis (F. 43, 49, 52, 54).

PHTHISIS

Phthisis, in this country termed Consumption or Decline, is the most common and fatal disease to which the human race is liable; it may occur in any country, and may attack either sex at any age. If the unity of phthisis is admitted, as histology seems at present to show, there is no need for applying different terms to the disease. Scrofulous phthisis, hæmorrhagic phthisis, and catarrhal phthisis may be conveniently abandoned, but it appears to us doubtful if we can do away with fibroid phthisis or laryngeal phthisis, for although tubercle exists in both, its symptoms, course, and duration differ from the type of phthisis acute or chronic.

Etiology.—By whatever name it is called—predisposition, tendency, or taint—there can be little doubt that phthisis is *hereditary*. *Climate* also seems to influence it, for it is more common in temperate climates than it is in those where extreme heat or cold prevails; and various statistics evince that in temperate climates, in low and damp situations, it is more prevalent than where the soil is dry and the position elevated. Bad air, inefficient ventilation, poor food, and occupations where dust or solid irritating particles are inhaled, not unfrequently produce it. It may also follow on measles, hooping-cough, syphilis, diabetes mellitus, continued fever, or other pulmonary affections. Premising that acute phthisis (galloping consumption) is rare, we will now proceed to speak of the general symptoms and physical signs of chronic phthisis.

General Symptoms.—The words "failing health" in their broad meaning seem to express the first leading features of phthisis. There is a sense of fatigue after exertion, such as walking quickly or in ascending stairs. The breathing is hurried, although no cough may be manifested. Subsequent to this, at varying intervals there is progressive emaciation and loss of flesh, proceeding in some cases with great rapidity. This thinness and weakness necessitates a careful examination with the thermometer morning and evening for not less than two or three days, and the exception is not to find in the evening an increase of temperature. The pulse also is quickened at the same time, and in some instances is affected by exertion, or by a change of position, as sitting down or standing up. The aspect of the patient is suggestive at this stage, for a bright eye and a flushed face go hand in hand with the wasting frame. Vomiting and diarrhœa may also attract attention.

The symptoms, which point peculiarly to the lungs, generally succeed to those mentioned, but as there is no rule without exception, cough may be the first indication of illness, arising, as popularly expressed, from a "neglected cold"; the patient notices that his throat has to be cleared in the morning, but little, if any, expectoration comes up. Afterwards this dry cough is accompanied by a clear sticky sputum, in which streaks of blood are present from time to time. When observed, they are of great diagnostic and practical importance, as they are sometimes the precursors of severe hæmorrhage, which by the laity is termed "vomiting of blood." This hæmorrhage may occur at all stages of phthisis, and an alarming hæmorrhage may be the first proof of the affection of the lung; and many cases are characterised by special tendency to hæmorrhage, while in others it never occurs (see p. 13).

Dyspnœa is not a very marked symptom, but there is often pain in the shoulder, or beneath the clavicle; and if there is not actual pain, there is a dull aching feeling

at the sites mentioned. The pain when present is doubtless due to a direct extension of the tubercular process from the lung to the pleura.

Physical Signs.—We will now allude to the physical signs, which correspond in point of time with the general symptoms mentioned. These signs are due to progressive consolidation, which begins as a rule at the apex of the lung involved. If the physician stands behind the patient, who is undressed, with one hand placed lightly below the clavicles, he can feel this consolidation by the different and deficient expansion of the two sides. If he percusses the supra- and infra-clavicular spaces, and also the supra-scapular region, he may elicit a stroke of impaired resonance or actual dulness. On auscultation over the same parts he will find—(1) interrupted respiration at one apex, jerking or dry clicking; (2) prolonged expiration of a harsh character. When the consolidation has become more marked and is tending to break down auscultation will reveal—(3) sub-crepitant moist sounds, or bronchial or tubular breathing. Apex catarrhs are as a rule tubercular, hence the significance of the signs mentioned. It must be remembered that the general symptoms and the physical signs must be considered together as bearing on the diagnosis of early phthisis. We cannot decide except by the totality of the facts in a case which has not a family history of tubercle.

Before proceeding farther we may now briefly allude to the nature of tubercular change.—Avoiding all controversial points as to its etiology being primarily bacillus or otherwise, we may state that tubercular change usually begins in the walls of the smallest bronchi, generally in one or two circumscribed spots, and in the great majority of cases in one apex. The tubercular infiltration thus begun in the bronchial wall spreads gradually to the periphery, establishing tubercular peri-bronchitis, in which are noticed "cheesy nodules," which at first are gray, and later yellowish. The adjacent nodules run together; a little irregular excavation succeeds, which is the first

beginning of the formation of a cavity. With the disease of the smaller bronchi the alveolar tissue of the lung is also affected, and partial lobular pneumonia results, which, from its tubercular character, becomes caseous. The alveolar walls are also diseased, and the destruction of the cheesy tissue results in the further formation of cavities, or in diffuse caseous pneumonia. With these destructive processes there is a tendency towards circumscribing the disease, thus limiting its growth and causing healing. New connective tissue forms round the tubercular infiltration, especially where there is already destruction of tissue, and this chronic interstitial process leads to contraction, and the formation of a cicatrix. In chronic phthisis the conservative contractile changes evidence that the tubercular process may heal. This tendency to heal may, however, be baffled by the infectious material being carried into other bronchi, and in this process the TUBERCLE BACILLI are important agents. So new tuberculosis is set up, and the disease is constantly extended.

When the incipient or first stage is past, and the disease, unless arrested, has proceeded unchecked, we enter on a field unfortunately much more free from dubiety. Consolidation has broken down, excavation has ensued, and a cavity or cavities are formed. The layer of lung forming the wall of the cavity is in itself thick and solid, and this in many cases is aided by pleuritic adhesions. Hence on inspection we observe flattening of the apex or apices, and on percussion over this flattened spot or spots, we find the sound is dull, or if there is a free communication with the open bronchi and the mouth, a *cracked-pot sound* is heard (*bruit de pot fêlé*); on auscultation "gurgling" is detected by the air bubbling through liquid, or if the cavity be dry and hollow, "cavernous or amphoric respiration" is revealed. When the patient is asked to speak, "bronchophony" or well-marked "pectoriloquy" is heard. Frequently a murmur is detected below the clavicle on the left side, following the first sound of the heart, and this is presumed to be due to adhesion at the apex of the lung.

The shrinking thus occasioned produces a bending and alteration of the subclavian artery, and the blood flowing through the narrowed channel gives rise to the murmur. The cough is frequent and irritable, and the expectoration is thick, yellow, sinking in a kind of thin glairy liquid. Its pellet-shaped or coinlike character has led to its being designated as *nummular*. Later on its nummular character is lost and it becomes distinctly purulent, sometimes having a green colour and most offensive odour. The general symptoms now markedly increase in severity. In the morning the temperature is normal, in the evening it rises to 103° or 104°. Profuse night sweats, diarrhœa, lack of appetite, and vomiting weaken the system. Swelling of the feet and ankles supervenes some days or weeks before death, which is due to—(1) exhaustion; (2) excessive secretion and consequent suffocation; (3) pneumothorax; (4) hæmoptysis. The first mode is the most common.

Symptoms and Complications of other organs—Pleura.—The implication of the Pleura may result in pneumothorax (see p. 242).

Larynx and Trachea.—Although cases of primary laryngeal tuberculosis are known, yet in most cases the larynx and trachea are affected from pulmonary tuberculosis.

Intestinal canal—Peritoneum.—The tubercle bacilli rarely in phthisis infect the stomach, but in many cases they rest on and form ulcers in the vicinity of the ileocæcal valve on the lower part of the ileum and the upper part of the large intestine. The peritoneum may be infected from tubercular intestinal ulcers, so that tubercular peritonitis is produced.

Liver and Spleen.—Fatty and amyloid liver may ensue in the course of phthisis, or amyloid disease of kidneys and spleen, or acute or chronic nephritis.

Further, at autopsies of phthisical cases both lungs are ultimately found more or less involved in the tubercular degeneration.

Duration and Prognosis.—Statistics vary as to the

duration of phthisis; it may extend to two years or prove fatal in nine months. Pregnancy arrests its progress. The months of December and January are observed to be particularly fatal to phthisical patients. As indicated under Treatment, there is little room to doubt that sea voyages and high altitudes in the EARLY stage are notably beneficial, and that a hopeful prognosis may in many cases be given.

ACUTE PHTHISIS or SCROFULOUS PNEUMONIA is a rare disease, and runs a rapid course. It seems dependent on tubercular degeneration following catarrhal pneumonia; the pneumonic consolidation, instead of undergoing resolution, breaks down into soft cheesy matter, with the formation of cavities of various sizes, at times all over the chest.

It is attended with a sudden onset, shivering followed by a high fever, pain, cough, dyspnœa, profuse sweatings, rapidly-increasing weakness and prostration. The pulmonary mischief is evidenced by hurried breathing, and small and large crepitations not localised but general. There is usually an absence of tubercular symptoms in other organs.

In the only two cases I have seen, death occurred in less than five weeks. This is about the usual duration of the disease.

ACUTE TUBERCULO-PNEUMONIC PHTHISIS seems a connecting link between the two forms described, as it is frequently associated with tubercle in the intestines, and rapid tuberculisation of the lungs.

Catarrhal phthisis is described under Pneumonia, p. 218.

FIBROID PHTHISIS is a term introduced by Sir Andrew Clark to indicate cases of which fibrosis is the chief feature. There are two principal modes of origin of fibrosis: firstly, from attacks of pleurisy and pleuro-pneumonia, or interstitial pneumonia; secondly, from chronic pneumonia,

resulting from long-continued irritation of the lungs, through the inhalation of dust or dirt, such as prevails among fork- and knife-grinders, colliers, and button-makers. In the first form no tubercle bacilli can be detected in the sputum; in the second they can.

In the *first* form the history of the symptoms is as follows. There has been an attack of pleurisy with effusion, the effusion is absorbed, but percussion shows dulness over the whole side, and somewhat feeble respiration. A dry and hacking cough remains, with little expectoration, and the breathing becomes short after exertion. Then a few months later we find marked immobility of the affected side, with dulness throughout and considerable shrinking. This shrinking causes displacement of other organs. The stomach rises. If the left lung is affected, the heart is tilted outwards and remains uncovered. If the right lung is implicated, then the left may be drawn partly over the chest, and thus the area of resonance is abnormally increased. The impulse of the heart may be felt at the fourth interspace. The pulse is slow, and the temperature is rarely above the normal. The liver rises up to the fifth rib. The dyspnœa increases with the development of the disease, and the end is ushered in with signs of obstructed circulation, dropsy, and albuminous urine. The patient dies either from dyspnœa or blood-poisoning—symptoms rarely associated with death in cases of ordinary phthisis.

The autopsy reveals a lung contracted to the size of a man's fist, with thickened and adherent pleura, with widely-dilated bronchi, and with interlobular septa much increased in size. These septa encroach on the structure of the lung, which seems replaced by hard, fibrous tissue, deeply pigmented, mottled in parts with gray, and hard as cartilage in resistance to the knife. Caseous and cretaceous masses are found embedded in this structure, or sometimes excavations of various sizes. In the caseous masses but not in the fibrous tissue Watson Cheyne has found tubercle bacilli.

The symptoms in the *second* form resemble the first

in the contraction of the lungs and shrinking of the chest wall, but the expectoration is more abundant and contains a number of tubercle bacilli.

Fibroid phthisis differs pathologically from chronic pneumonia, described at p. 220, in this respect that the consolidation associated with the fibrosis of phthisis tends to break down, undergoing molecular death or disintegration, while that of chronic pneumonia presents no such tendency.

We must remember that most cases of chronic phthisis have the elements of fibrosis present in them, and in most instances it is the limiting agent to the spread of tuberculosis, and therefore much to be desired.

Laryngeal phthisis (see p. 192).

Treatment.—The general treatment is indicated under tuberculosis. With regard to other remedies, cod-liver oil has deservedly been the sheet-anchor of the profession for many years. It affords the greatest amount of nourishment in the smallest form, and should be commenced in a teaspoonful dose at bedtime in lime water, lemon juice, or with 3 or 4 drops of chloroform, then gradually increasing the dose, until an ounce or more be taken after food. Its efficacy in the early stage of phthisis is greatly aided by giving with each dose five grains of the hypophosphite of lime (F. 65*d*). The oil may also be rubbed in externally, especially if the stomach cannot digest it. Glycerine can sometimes be taken with advantage in dessert- or table-spoonful doses thrice daily, either alone or with the syrup of the iodide of iron in a bitter infusion. Pancreatic emulsion has by some been considered beneficial. For children and young people butter eaten with bread is an excellent substitute for oil; they will increase in weight, if it is given in large quantities daily, say from two to five ounces. Adults who cannot digest oil often improve on fresh cream, to which is added some salt, sugar, and rum. Counter-irritants, as croton oil or iodine paint, should also be employed over the front of the chest.

It is better at first to allay the cough with inhalants than cough mixtures. The hop inhalation can be specially recommended (F. 52).

Opium, or some of its preparations, forms the essential ingredient in all useful cough mixtures, and must be given in later stages, when it would be cruel and impossible to dispense with these (F. 71). The injection of ergotine is to be recommended in severe hæmoptysis, with gallic acid internally (F. 19), ice-cloths over the chest, and the sucking of ice. When the hæmoptysis is slight, but only then, the Liquid Extract of Hamamelis (Hazeline) in a dose of 20 m. every two hours may be relied on; it is of little use when the hæmoptysis is great. To control the diarrhœa chlorodyne is useful; and to prevent sweating the hypodermic injection of Atropine (1 to 4 minims); Agaric acid, $\frac{1}{12}$ grain; Camphoric acid, 30 grains, is highly serviceable. The following treatment has been recently recommended in acute phthisis. Careful nourishment, stimulants in small quantities at regulated and repeated intervals, the subcutaneous injection every night of $\frac{1}{100}$ of a grain of atropine, with antipyretic remedies in the form of iced cloths to the abdomen, 10 to 30 grains of quinine in one dose daily; or one grain of quinine combined with half a grain of digitalis and a fourth of a grain of opium, as in "Niemeyer's pill."

Prophylactic, Climatic, and Dietetic Treatment.—It is of the utmost importance to strengthen the system in early youth of those who have the hereditary predisposition to phthisis. Among many factors for good may be mentioned cold sponging and cold baths to harden the constitution against being influenced by changes of the weather. If circumstances permit, young people from the ages of ten to fourteen years, whose parents were or are phthisical, should breathe during winter the aseptic air of a high altitude. The lungs are thus expanded, and the epoch of puberty may be passed in safety. If symptoms of phthisis are seen in a person engaged in an occupation which is injurious to the respiratory system, such an occupation must be given up. Thus workshops

or factories where dust is inhaled, or offices badly ventilated, are recognised to have a very serious effect in evoking tubercular change, and those employed in such places, whose health has commenced to give way, should change their occupation and if possible obtain work where they would be much out of doors. The diet in phthisis should be nutritious. The attendant wasting must be met by taking hydrocarbons, fat meat, cream, eggs, butter, and farinaceous food. Experience testifies that alcoholic stimulants or wine are specially useful, and the ease with which phthisical patients can take large quantities of these without harm is a distinct proof of the system requiring such support. A general rule with regard to stimulants in phthisis can hardly be formulated, yet the following statements bear pertinently on the questions involved in sanctioning their use. If the immediate result is a sense of vigour and comfort, if lassitude is removed, if there is a greater disposition for exercise, if there is no excitement of the circulation or of the nervous system, then *stimulants do good.* If, on the contrary, stimulants excite the circulation and the nervous system, if after taking them there is a feeling of weakness and a desire to rest or sleep, *then they do harm.* The form selected should in the main be left to the patient's taste. Yet the remedial principle in stimulants is alcohol. Preferences for and experimental trials with wines, spirits, ale, or porter must decide in individual cases. *As a rule, with any form of stimulant, food should be taken.* Malt extracts, so much lauded, have little nutritive value. They are no substitutes for alcohol.

The appetite should often be tempted with dainty and nourishing food, but not so often as to cloy the desire to eat.

For delicate patients, especially ladies who are unable to take exercise, and who suffer from fever and hæmoptysis, the climatic health resorts of Algiers, Madeira, or the Canary Islands are most suitable during winter. In incipient cases, especially of males, a timely sea voyage is of inestimable advantage. "Of all the remedies for

phthisis," says Sydenham, "long and continued journeys on horseback bear the bell. Bark is no surer cure for ague than riding is for phthisis." When patients have no hæmoptysis, no great fever, and no laryngeal symptoms, Davos Platz, with its keen pure air, can be specially recommended in winter, and in *summer* a change may be made to Meran; or Badenweiler and Rippoldsau in the Black Forest; or to a high altitude at Aussee, St. Moritz, Seelisberg, or Pontresina; or to a place impregnated with the odour of pines, as Bournemouth; or to stations where whey and milk cures in mountain air form means of treatment, as Gais and Herculesbad.

For those who elect to make a permanent home in another country, the State of Colorado presents means of cure and prospects of employment afterwards, which none of the other places mentioned possess. The altitude of Denver, Pueblo, and Colorado Springs in the State of Colorado is high, and a man whose health has been restored may in any of them live and work and do well.

PLEURISY

Pleurisy was the designation given at one time to every pain connected with the chest, but now it is exclusively applied to inflammation of the serous membrane lining the walls of the thorax and investing the lungs. It may thus be either single or double, according as one side or both sides of the chest are affected. It may also be either acute or chronic.

Symptoms.—In acute pleurisy the attack is generally sudden, and sometimes accompanied by a rigor, at the same moment the leading and characteristic feature of the affection is manifested—viz. an acute and lancinating pain, called a stitch, and generally referred to the region of the mamma. The respiration is short and hurried, and is usually performed with most difficulty when the patient lies on the affected side. A short, hard, dry cough is almost always present, and as this cough aggravates the

pain the patient attempts as much as possible to stifle it. The temperature rises to 101° or 102°, and the pulse is frequent, full, and hard. The tongue is coated with fur, and the urine is scanty.

Such are the external features of acute pleurisy in the early stage, and if the stethoscope is applied near to the seat of the pain the auscultator detects a *friction sound* or "rub," which is due to the opposed pleural membranes grating upon one another, and this friction can often also be felt on palpation. If we could see the pleural surfaces at this time we would observe a thin layer of lymph of a soft whitish consistence lining the membranes, and if the inflammation is cut short, this lymph is absorbed, and the investing membranes glide over one another as in health. Consequently the friction sound disappears.

But should this not occur, an effusion of serous fluid takes place into the cavity, and the external features and the auscultatory signs undergo a change. The affected side shows distension, the intercostal spaces are bulged out, and the lung is pressed back against the vertebral column. The air is squeezed out of it, and as the effusion increases it becomes less and less fit for its function. The breathing is difficult, and is aggravated by lying on the sound side. Percussion now shows dulness corresponding to the extent of the effusion, and this dulness may be complete or partial according as the fluid fills the whole or only part of the pleura. When the patient sits up, the fluid, unless bound by adhesions, changes its position and gravitates to the most dependent part. The alteration of the level of dulness occasioned in this way is not great, amounting only to a finger-breadth or two. There is also a loss of vocal fremitus. Auscultation reveals no breath-sounds over the usual sites, but if we listen at the back where the compressed lung rests, we may detect bronchial breathing, if the pressure is not complete, which is like that of pneumonia, yet differing in being softer to the ear or more distant. The resonance of the voice through the chest is altered; it becomes shrill and tremulous, and from its supposed resemblance to the

bleating of a goat, Lænnec termed it *Ægophony*. It occasionally appears and disappears. The particular region for hearing this sound is at the inferior angle of the scapula and round to the axilla. Moreover, if the effusion is great there may be considerable displacement of organs. Thus if on the right side, the diaphragm may be depressed and the liver displaced downwards. In extreme cases affecting the left side the heart may be seen beating on the opposite side of the chest. In single pleurisy the inaction of the affected lung throws increased work on the sound one, and the inspirations are correspondingly strong. They lose the natural soft vesicular character of adult health, and become loud and pronounced like that of a boy—hence the term *puerile breathing*. Mensuration will also show an increase of the affected side as compared with the sound one.

Course and Event.—The effusion may never become purulent, but may be absorbed, as evidenced by a gradual diminution of the dulness; and if no adhesions exist, the lung regains its natural size and resumes its natural functions. But if there are adhesions it cannot proportionately expand, and although fair health may be maintained, the affected side shrinks in comparison with the sound one. The course of pleurisy may, however, be changed, and for the worse—the fluid becomes purulent, hectic fever develops, and often violent shivering fits recur at irregular hours, and the expectoration is sometimes offensive to the smell and purulent in character. This termination of pleurisy is termed EMPYEMA. Sometimes without empyema and without any great absorption of the effused fluid, the disease passes on to a chronic stage, *chronic pleurisy*, the symptoms and signs of which are described at p. 241.

EMPYEMA.—The course of empyema is varied. Sometimes the pus escapes through the lung into the bronchial tubes, giving rise to the purulent expectoration previously referred to, and if the opening leads directly into the bronchial tubes, air passes into the pleural cavity, to take

the place of the liquid, and the condition "Pyopneumothorax" results. But in many cases no such result follows. Traube's explanation of this is that if the pleura alone is eaten through, the alveolar texture of the compressed lung may allow pus to be forced through it by violent coughing, while it yet fails to afford a passage to air in the opposite direction, especially as there is little or no movement on that side of the chest during inspiration.

In other cases the empyema points at an intercostal space, and in course of time an external opening is made, generally below the nipple, and the imprisoned pus escapes in large quantities. Sometimes in empyema the diaphragm may be perforated, and occasionally pus makes its way backwards from the pleural space behind the diaphragm and points at the loin or popliteal space. Unless the pus escapes through the pulmonary tissue the spontaneous discharge of an empyema is attended by a long and trying illness, with great emaciation and exhaustion, which very often leads to the death of the patient. The only hope of recovery is the obliteration of the whole cavity by the formation of granulation tissue, and by the contraction of the fibrous material developed from it. Then the ribs fall in, and the dorsal spine becomes curved, with a concavity toward the affected side. The shoulder also shrinks, the diaphragm is moved upwards with the abdominal viscera, and there is such misplacement of the heart that its impulse can be seen and felt over an extensive and abnormal area.

Duration.—The duration of an ordinary attack of acute pleurisy varies; sometimes amounting to five or six days, sometimes to as many weeks.

Varieties.—Usually pleurisy is single, but the disease, although primarily affecting one side, may spread to the other, constituting Double Pleurisy. Sometimes the pleurisy is *dry*, with no exudation; sometimes it is *latent*, with little fever, little pain, no dyspnœa, and yet an extensive pleuritic effusion; sometimes it is *diaphragmatic*, with pain in the hypochondriac region reflected to the clavicles, great dyspnœa, breathing markedly thoracic

in type, cough, intense fever, and vomiting. Some also recognise "Tubercular Pleurisy," and rightly if by this is meant that phthisis frequently follows on pleurisy after an apparently favourable course; and when the pleuritic effusion seems to have been absorbed after a longer or shorter period of seemingly restored health, a "new" disease appears that is either a return of the pleurisy, a pleurisy on the other side, or some other acute or chronic form of a tubercular affection. Recovery from pleurisy is always to be carefully watched, and precautions against cold sedulously enforced.

Diagnosis.—*Pneumonia* and *pleurisy* have certain things in common—viz. pain in the side, fever, dyspnœa, cough, and dulness on percussion; yet a careful physical examination shows distinctive features in these signs. Favouring pleurisy are—(1) a marked distension of the affected side; (2) dulness more complete; (3) diminished or suppressed respiratory murmur; (4) vocal fremitus absent or diminished; absence of rusty sputum, herpes on the lips, or fine crepitation. To tell whether the fluid is still serous or has degenerated into pus (empyema) is a point of great practical importance in regard to treatment; a serous effusion may be absorbed, but, if purulent, absorption is out of the question. We may learn much from the history and the symptoms of the case, for long continuance of the disease, shiverings, hectic fever, night sweats, rapid emaciation, indicate empyema. The only certain information is, however, afforded by an exploratory puncture with a hypodermic syringe and a careful inspection of the fluid withdrawn. *Intercostal neuralgia* may simulate the first stage of pleurisy, but it is distinguished from it by the pain not being aggravated by breathing, and by the absence of friction sound and fever. *Cancer of the lung* presents physical signs closely resembling those of a pleural effusion. It does not, however, cause enlargement of the affected side, and it is also a disease so rare as practically to be left out of account, unless the history and the cancerous cachexia, and the probably "red currant jelly expectoration," point to its occurrence.

After the foregoing remarks the PATHOLOGY of pleurisy may be shortly stated thus :—

1. Some redness of the pleural surfaces, and with no effusion.

2. Exudation partly serous and partly fibrinous, the fibrine being deposited on the inflamed surfaces ; and as inflammation goes on this fibrine is replaced from below upwards by an inflammatory growth comparable to granulation tissue.

3. The fluid may be absorbed, and thus the two granulating surfaces coalesce, obliterating the cavity.

4. The fluid may increase and become purulent.

Prognosis.—Favourable if single and primary ; unfavourable if the effusion becomes purulent. If secondary to other diseases, it may so complicate matters as to be the immediate cause of death.

Treatment.—If the case be seen in the early friction stage, and before effusion occurs, undoubtedly a large fly blister applied may prevent any further mischief. The administration of a purgative followed by a soothing expectorant mixture (F. 43) is also advisable. Tincture of aconite combined with tincture of opium, as—

℞ Tinct. Aconiti ℥ii.
Tinct. Opii ℥vi. M.

—eight drops of this in water every hour or two hours, in the early stage, also tends to limit the inflammation, while hypodermic injections of morphine are serviceable in relieving the local pain. If effusion has already taken place, then it is necessary to employ remedies to promote absorption. Of internal remedies special mention must be made of Guy's pill (F. 36), which should be given until a slight constitutional effect is produced when it should be stopped. Then prescribe iodide of potassium, or preferably salicylate of sodium, 15 grains thrice daily, with nourishing diet, and wine. The local ap-

plication of small blisters, or of the unguent. hydrarg. iod. rubr. (F. 5), materially assists the action of the internal remedies.

If the symptoms point to empyema, and if the supposition is verified by an experimental puncture with the hypodermic syringe, then paracentesis should be adopted without delay. It is fundamentally wrong to leave pus in the pleural cavity.

The best position for the puncture, because generally the most dependent and the least likely to do harm, is between the seventh and eighth ribs, a little inside the scapula and towards the axillary line, care being taken to avoid wounding the intercostal artery. An incision, one to two inches in length, may be made in this situation parallel to the ribs.

The pus comes away freely. The imprisoned lung, unless bound down by adhesions, rises up to fill the cavity made by the exit of pus, and the insertion of a small tube secures free drainage.

There is no necessity to syringe the cavity if the pus is laudable, without odour, for syringing tends to irritation. Should the pus, however, be bad-smelling and offensive, syringing is essential twice daily with acid. carbolic. gr. iss, glycerini m. lx., aquæ ℥i; or 1 part salicylic acid dissolved in 760 parts of water.

The chances of recovery from empyema are better in children and young adults than in middle-aged persons, or in cases which have lasted for some months. When the pus comes away, as it were, all at once, and entails no prolonged after-drainage, the prognosis is favourable.

Should puncture be made with the aspirator when the fluid is not purulent but serous? This is a grave question. Aspiration should never be lightly undertaken. However carefully performed, it is attended with great risk. A bland exudation may be rendered purulent, and a tedious recovery results. In some exceptional cases a fatal result almost immediately sets in. Nature, aided by the means mentioned, generally procures, if patiently waited for, a satisfactory and normal recovery.

The only exceptions to this statement are when death seems imminent by dyspnœa, and the operation is demanded to save life; and when, after a month's duration of the effusion with no fever, percussion reveals no diminution of the dulness. The probability in the latter case is that the lung becomes covered with a fibrinous deposit, and absorption of fluid by ordinary means is impeded.

To perform the operation satisfactorily, the patient should assume a semi-recumbent position, the aspirator should be carefully tested with water to see that it is working properly, and the fluid should be drawn away slowly, rather, I think, by operations at intervals of a day or days than all at once. This remark holds good if the effusion is found to be serous and unstained by blood, but if purulent, do not trust to the aspirator; let the pus out, and resect a portion of one rib, and if necessary insert a drainage tube, and wash out the cavity daily with the antiseptic lotions previously mentioned.

Chronic Pleurisy.—As in simple pleurisy, the pleura is full of fluid to a greater or less degree, but this fluid is milky or purulent, and often coexists with a pulmonary fistula. If the pleurisy be double, it is frequently associated with tubercle.

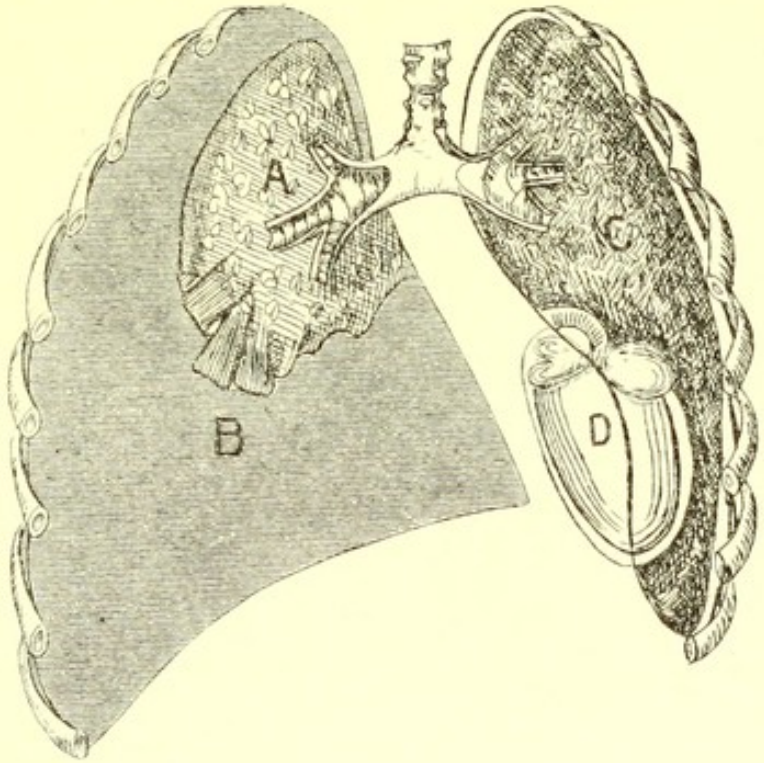
Symptoms.—As in acute pleurisy after exudation, there is absence of thoracic vibration, with complete dulness, and loss of the respiratory murmur. The side affected remains immovable, the intercostal spaces are filled up, while any other position than lying on the back, or the side affected, is impossible. When chronic pleurisy is primitive, *i.e.* does not follow on an acute affection, it does not announce itself by any local pain; the fever, if any, is irregular, with little or no dyspnœa. In fact, the pleura may sometimes be full of fluid without the patient being conscious of this. After this mode of invasion, tuberculosis is apt to set in with weakness and enfeebled digestion, followed by hectic fever and night sweats.

Treatment should be tonic—cod-liver oil, syrup of the iodide of iron, and good nourishing soup and beef-tea.

Should there be no indication of tuberculosis or cancer, should the effusion seriously endanger the patient's life by suffocation, and should it fail to be removed by the means mentioned, or by absorbent or diuretic treatment (F. 35, 36, 37), it is advisable to perform paracentesis.

Pneumothorax.—This condition may result from injuries—as broken ribs or falls or strains, or from hooping-cough, pleurisy, or emphysema—but in the great majority of cases it is associated with phthisis. In the process of tubercular ulceration and by the force of coughing an opening is made into the pleural cavity, and subsequently at each successive inspiration air enters, and pneumothorax is established. The external signs show that the intercostal spaces on one side are distended, and that there is in most instances lateral displacement of the heart. By percussion the sound elicited, as a rule, is hyper-resonant, clear, and hollow. Yet not always so, for if the air should accumulate so as to cause increased distension, it may make the pleural cavity tight as a distended drum, with all escape of air from its cavity prevented, and then the percussion note is "muffled, toneless, almost dull." Within a few days pus is formed, and the condition known as pyo-pneumothorax is established, the signs of which are very characteristic. When the ear is applied to the chest no respiratory murmur is heard, but in its stead a sound is detected which is like that of a pin falling into a metal cup, and hence the name *metallic tinkling*. This is a liquid sound, produced by the bursting of bubbles in a large space, which is filled with air and has a smooth surface. As Lænnec showed, this sound may be occasioned by the dropping of liquid from the upper into the lower part of the pleural space, when it contains air as well as pus. So also coughing and drawing in the breath may initiate it, and in some way not very well understood, speaking intensifies the sound. When the patient's body is shaken a "succussion splash"

PLEURITIC EFFUSION.



A.—VOCAL RESONANCE INCREASED ABOVE (BRONCHOPHONY): DIMINISHED COMPARATIVELY BELOW (ÆGOPHONY):

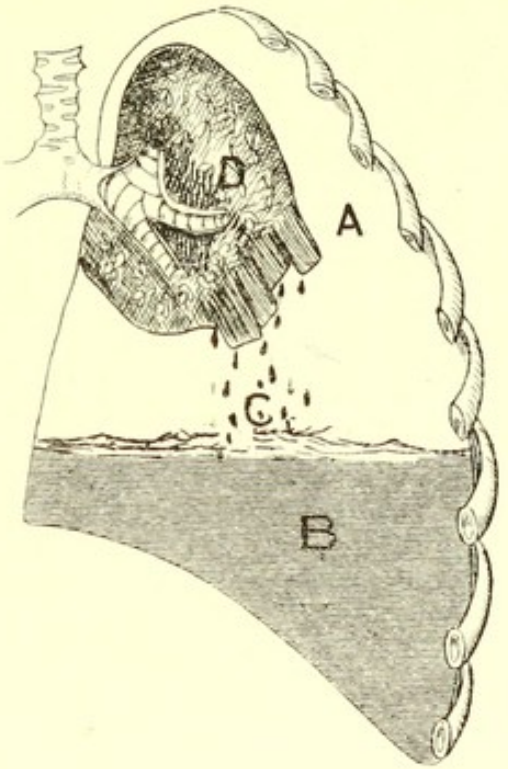
B.—VESICULAR BREATHING ABSENT.

C.—PUERILE BREATHING.

D.—HEART DISPLACED.

PNEUMOTHORAX

WITH EFFUSION.



A.—PERCUSSION TYMPANITIC ABOVE, DULL BELOW (B.)

C.—METALLIC TINKLING, SPLASHING ON SUCCUSSION.

D.—AMPHORIC BREATHING HEARD OCCASIONALLY.

is produced, and as this was known to Hippocrates, it is sometimes alluded to as "Hippocratic succussion." In all cases of pneumothorax a *metallic echo* can be elicited in the following manner: The physician applies his ear to the chest, while an assistant uses two coins, one as a hammer, the other applied as a pleximeter to the chest; the result is that a sound is borne to the listener's ear clear and ringing, and not unlike the chime of a small clock—hence the name the *bell sound*.

In cases of injuries or strains the general symptoms of pneumothorax are marked by the distinct sensation of something giving way in the chest, with sudden pain, great dyspnœa, faintness, intense anxiety; afterwards the lips become blue and swollen. But in cases of pneumothorax in phthisis the symptoms are masked by the recumbent position of the patient, and the external signs are alone manifested. In most cases pneumothorax proves fatal in the course of a few days, although this issue may be delayed by paracentesis.

HYDROTHORAX.—The occurrence of a serous transudation into the pleural cavity, independent of an inflammation of the pleura, is termed hydrothorax or thoracic dropsy. It is usually bilateral, and in the great majority of cases is part of a general dropsy, especially in emphysema and in cardiac or renal disease. The absence of adhesions, the frequent and very loud respiratory murmur, the more marked change in the boundary line of the dulness, distinguish hydrothorax from an ordinary pleuritic effusion dependent on inflammation.

DISEASES OF THE CIRCULATORY SYSTEM

THE PULSE.—The pulse is felt best wherever an artery lies near the surface, and can be pressed against a bone beneath it, and for practical purposes the radial artery at the wrist is almost always chosen.

In the examination of the pulse, the first three fingers are laid lightly on the artery, and its characters noted as to frequency, size, uniformity, and strength. Certain abnormalities betoken disease.

1. *Excessive Rapidity.*—The normal rate of the pulse in an adult is about seventy-two beats per minute, but certain states, such as excitement, exercise, the partaking of food, or the sudden assumption of the upright position, may cause this standard to vary without the health being impaired. With many pathological conditions the pulse is quickened, *e.g.* fever, anæmia, or chlorosis, cardiac failure from any cause, Graves's disease, nervous disorders as in locomotor ataxy. Other signs in these cases indicate, in addition to the condition of the pulse, the nature of the disease present, but in some cases the rapidity of the pulse is almost the only reliable diagnostic symptom observed, *e.g.* in certain gouty states, or when there is much mental worry. When there is some disorder of the nervous mechanism of the heart the pulse rate may be greatly increased.

2. *Slow Pulse.*—This may not indicate in some persons any departure from health, but it is usually associated with diseased conditions, as jaundice, fatty degeneration of the heart, and some forms of epilepsy.

3. *Intermittent and Irregular Pulse.*—The pulse may vary in its rhythm in relation to the action of the heart or independently of this, and further this variation may be regular or irregular in its occurrence. Nervous excitement, abuse of tea or tobacco, notably cause for a time a quick and irregular pulse without any cardiac lesion. A truly irregular pulse is one in which the rhythm and force of the pulse-beats vary irregularly, and this is especially associated with cardiac failure and mitral valvular (most often obstructive) disease.

4. *High-Tension Pulse.*—A normal pulse is, as a rule, easily compressible, and between the beats the artery can hardly be felt, but increase of the peripheral resistance, together with a corresponding increase of the ventricular systole, produces the high-tension pulse. The characters

of this are, its impulse is gradual, its duration long, its subsidence slow, and the artery is felt between the beats as a firm round but compressible cord. If with the peripheral resistance still continuing, the heart power should fail, the pulse of high tension becomes one of "virtual tension." As a rule, a high-tension pulse indicates an impure state of the blood, which renders it incapable of passing easily through the capillaries on account of a degree of spasm in the arterioles, and which is produced by abuse of nitrogenous food, constant alcoholic excess, and deficient exercise. It is also especially found in association with kidney disease, lead poisoning, and pregnancy.

The pulse of "virtual tension" is most often found in the late stages of Bright's disease.

5. *Low-Tension Pulse.*—The artery is scarcely to be felt between the beats, and the pulse is easily obliterated by pressure, hence the arterial tension is sudden in its onset, short in duration, and quickly declines.

When the arterial tension is very low the dicrotic pulse is observed. The meaning of the term is that on applying the fingers very lightly to the artery a second impulse can be detected following the first.

6. *Senile Pulse.*—This pulse occurs in elderly or prematurely old people, and may be considered as indicative of an atheromatous condition of the vessel. It may be recognised by the fact that although an amount of firm pressure quite sufficient to completely obliterate the pulsations be applied to the vessel, the feeling of a *cord* still persists under the finger. In many instances this condition may be recognised by the eye, and often the vessel may be seen to be tortuous.

7. *Corrigan's Pulse* is a special form of low-tension pulse which is associated with aortic regurgitation. Its impulse is sudden, large, and of short duration. Its fall is abrupt, and between the beats it can hardly be felt (see p. 259). It depends upon the ventricular dilatation and hypertrophy which accompany this form of heart disease, propelling the blood with full force, which, however, is

not permanent, for immediately after the systole is over the artery is no longer kept extended, but collapses, and this is greatly due to the backflow of blood into the ventricle through the non-closure of the aortic orifice.

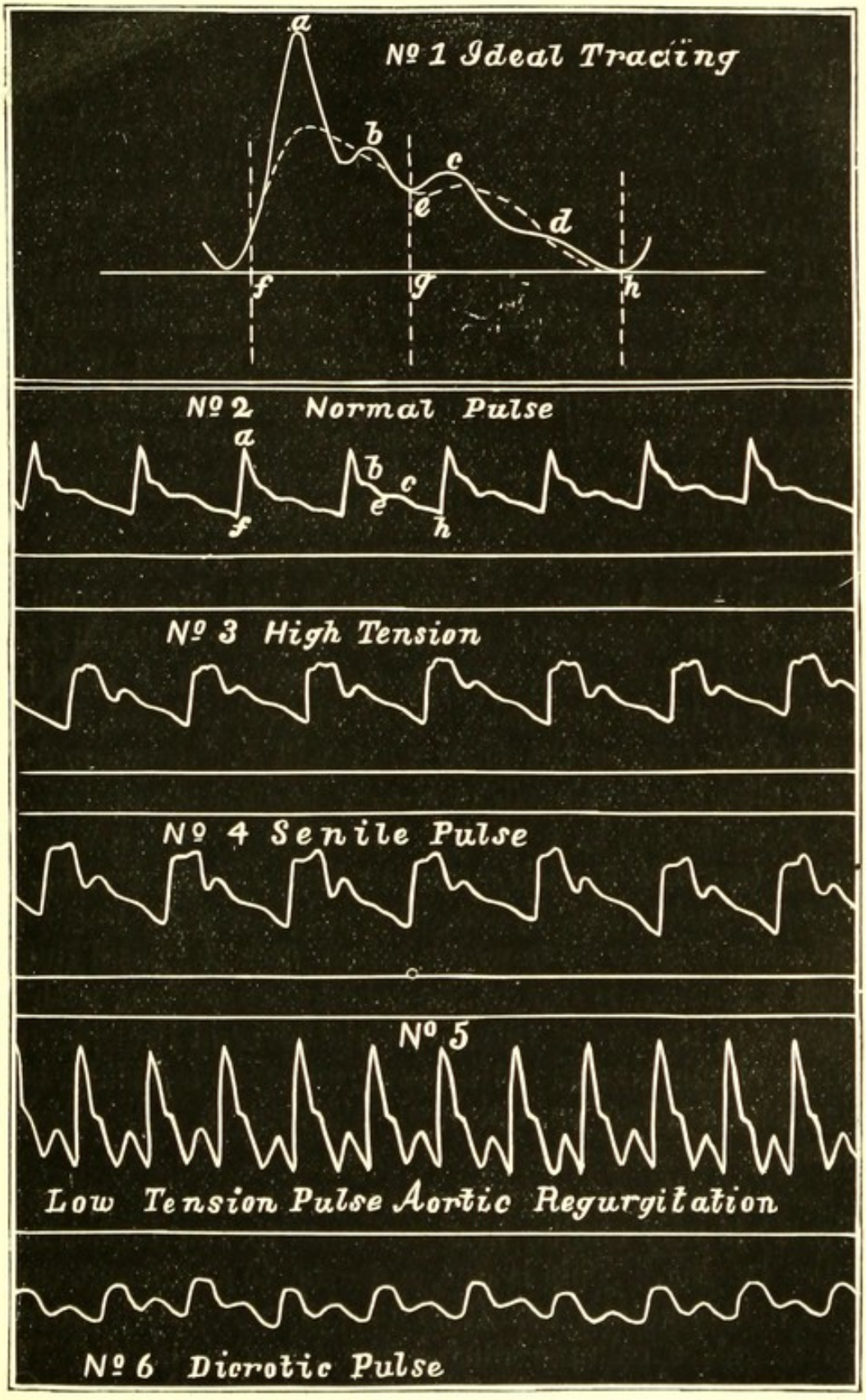
Capillary Pulsation is especially noted in aortic regurgitation. If the skin over the forehead be rubbed in this disease, the capillary vessels will be seen to pulsate distinctly with each beat of the heart.

8. *Venous Pulse.*—It has been shown by Dr. Broadbent that in the same conditions the pulsation may be communicated even to the veins, and can be seen in the veins of the wrist when the hand hangs down. Pulsation also occurs in the veins of the neck in tricuspid regurgitation. The systolic shock of the right ventricle is communicated to the contents of the right auricle, and through them to the superior vena cava and its radicles.

9. *Aneurysmal Pulse.*—In thoracic aneurysm the interposition of the aneurysm constitutes an elastic reservoir between the heart and the radial artery, and modifies the condition of the radial pulse. The artery remains full between the beats, and the pulse is small. The impulse is not sudden. It lasts long, and it subsides in a gradual manner. If from the position of the aneurysm only one radial pulse be affected, a comparison of the pulse in it with the one unaffected brings these points out in a marked manner. A sphygmographic tracing shows a low and gradual ascent, a rounded summit, a gradual descent, and almost entire obliteration of the secondary waves.

The Sphygmograph.—The sphygmograph consists essentially of a slender lever, which is moved by the pulsations of an artery. The end of the lever rests on a strip of smoked paper. When the paper is put in motion, by means of a mechanical contrivance, the movements of the artery conveyed through the lever are traced on it. The two varieties of sphygmograph commonly in use are Marey's and Dudgeon's. Reliable results can only be obtained by experience and practice. The instruments are so constructed that a definite and known amount of pressure may be exerted on the underlying artery.

An *ideal tracing* (see Fig. 8) consists of the following



The tracing in Figure No. 1 is on a different scale from those following.

Fig. 8.

parts :—(1) A *primary* or *percussion* wave, *a* ; (2) a

secondary or *tidal* wave, *b*; (3) a *dicrotic* wave, *c*; (4) a *fourth* wave, *d*; and (5) the aortic notch, *e*. The duration of the cardiac systole extends from *f* to *g*, and the duration of the cardiac diastole from *g* to *h*. The line *fh* is called the *basal* line. The dotted line represents the tracing which would be drawn if the instrument followed the movement of the artery with perfect accuracy (Galabin).

The *percussion wave* will thus depend on the completeness and fulness of the systole: a flaccid condition of the vessels will amplify it, and a state of tension reduce it. The presence of the *tidal wave* depends mainly on the duration of arterial tension due to the cardiac systole. If the tension is not maintained the percussion wave falls quickly till it is raised by the dicrotic notch.

Thus the *high-tension* pulse tracing (Fig. 8, No. 3) shows a broad apex. If a straight line drawn from the apex of the percussion stroke to the aortic notch *places the tidal wave much outside and above it*, a very high tension pulse is denoted. If, on the other hand, there is very *little tension* the tidal wave will correspondingly be very slightly developed, or it may be entirely absent, and be represented by a falling line with a very low aortic notch (see low-tension pulse tracing, Fig. 8, No. 5). A *dicrotic pulse* (Fig. 8, No. 6) is a low-tension pulse, and the second large wave which is seen near the basal line, in such a tracing, is due to the rebound coincident with the closure of the aortic valve. If the lever of the sphygmograph should descend still lower, and pass *below* the basal line, the tracing so obtained indicates a *hyperdicrotic* pulse.

The *senile* or *atheromatous* pulse tracing (Fig. 8, No. 4) is very similar in appearance to the high-tension pulse tracing. This is due, however, to a different cause. The atheromatous condition of the vessel wall prevents its complete collapse during the heart's diastole. The vessel is, as it were, maintained at a nearly maximum permanent expansion, and this condition is expressed graphically in the tracing.

PERICARDITIS.—The serous covering of the heart is liable to inflammation as the result of cold, of renal disease, of specific fevers, of wounds by fractured ribs, of the extension of inflammation from lungs or pleura; but, in the great majority of cases, pericarditis occurs during an attack of rheumatic fever. The female is less subject to it than the male, in the proportion of one to five.

The result of this inflammation is the exudation of lymph or serum; and in the early stage of the affection, supposing we were enabled to open the body, we would find the membranous sac partly filled with some serum, and probably with a plastic coagulable lymph. At a later stage, the effusion would be found completely to separate the membranes, while layers of lymph have been deposited on their surface so as to form false membranes. At a still later stage, the effusion may have been absorbed, and the two sides become glued together (adherent pericardium).

The deposited lymph we have mentioned, on account of the continual movement of the heart, is laid down in a somewhat unequal manner, or in layers, just as the tide leaves the sand ribbed; or in some instances it is shaggy, like the rough surface of tripe.

Symptoms.—On auscultating at an early stage of the disease, before effusion has occurred, a to-and-fro friction sound is detected, from the serous membranes not gliding upon each other with the ease and smoothness of health. Essentially the sound is of a rubbing character, and has been compared to the unfolding of a crisp bank note, to the rustling of silk, or to the creaking of new boots. The sound heard is essentially that of friction—light rubbing, scratching, grating,—and the impression borne to the ear is distinct from the generally soft blowing character of an endocardial murmur. It is also distinctly superficial, seeming to proceed, as it were, from a point immediately beneath the chest wall, and further, its occurrence is irregular in the cardiac cycle, following at one time the systole, at another the diastole. Most

commonly, also, both of the heart sounds remain audible, the friction murmur being interposed between them. It is not, moreover, propagated to such a distance as endocardial murmurs. These distinctive diagnostic points having been noted, it will be understood, in accordance with what has been observed as to the nature of the effusion, that the friction murmurs are like those of pleurisy, most intense at the beginning of pericarditis, when the amount of exudation is small and the two layers of pericardium are permitted to come closer together, and towards its termination when the fluid portion of the exudation is absorbed, and only the firm fibrinous part is left behind. At the time when the exudation is most abundant, the sound may disappear, the serous surfaces being held apart by the mass of fluid interposed between them. In this latter case the endocardium is also very often involved, especially the mitral valve, so that there is usually a systolic bellows-sound masking any friction sound which might otherwise be detected, and the murmur is permanent, unlike the friction sound, which does not, as we may recapitulate, last long. The patient may indeed die during its continuance, or the effusion may be so great as to prevent the membranes rubbing on each other, or they become adherent—glued together. When effusion has occurred, the dilated pericardial sac assumes a pyramidal form, with its apex upwards towards the second left costal cartilage, its base corresponding with the lower edge of the sixth rib; consequently dulness will be detected on percussion over this area, varying to some extent with the position of the patient. The apex beat also becomes vague and indistinct. If the pericardium becomes adherent, the dulness will be that of the normal heart. Can you tell if the pericardial adhesions have taken place? We have no certain signs, but we suspect this to be the case if dulness is unaltered by position or deep inspiration; if, similarly testing, the apex beat remains the same, and if one or more intercostal spaces or the epigastrium seem drawn in along with each pulsation of the heart.

The general symptoms attendant on pericarditis vary, and are sometimes so insidious as to attract little attention. This fact is often noted when pericarditis supervenes in the course of acute rheumatism. Pain, when the disease occurs from other causes, is referred to the cardiac region, and is increased by cough or pressure, or by lying on the left side. The heart's action is irregular and intermittent, and this is more apparent after the fatigue of speaking, or taking food, or any emotion. The patient lies propped up in bed, he has an anxious look on his face, and he breathes with difficulty, while he complains of headache and of disturbed and restless sleep. This restlessness passes into delirium in fatal cases, and is attended also with œdema of the lungs and other symptoms of mal-aëration of the blood.

Prognosis.—Pericarditis is a grave malady; yet, when occurring in rheumatic fever, it is not so much to be dreaded for its immediate as its after consequences, in producing endocarditis and leaving permanent valvular disease. Should it supervene in the course of a chronic disease, it is generally fatal, the prognosis being specially grave in Bright's disease and in cases of copious and rapid effusion. The prognosis should be determined rather by the complication than by the disease itself.

Treatment.—Pericarditis is usually associated with acute rheumatism, and is observed often in hospital cases on the day or night of admission, the seventh or eighth day probably of this fever. Salicin or the salicylate of sodium then does not seem to avert pericarditis, or to lessen its severity when it has occurred; but there is every reason to suppose that had the salicylate treatment been used from the commencement of the rheumatic fever, in all probability the pericarditis would have been averted, for before the time mentioned the primary fever would have been arrested.

If, however, in a case of rheumatism, symptoms of pericarditis appear, the line of treatment now adopted is not of an active character. Neither venesection nor mercurials are employed, but as a rule leeches are recom-

mended to be applied to the cardiac region, and after the bleeding has been arrested, warm fomentations are used. Opium internally or morphine by injection relieves restlessness and procures sleep. The tincture of digitalis is the remedy relied upon, in 10-minim doses every four hours, when the heart's action is tumultuous and the pulse quick. Though digitalis strengthens cardiac action by reducing the beats, yet its administration must be carefully watched, and even suspended if the pulse does not gain force by its use. Sometimes these means fail to relieve pain or to prevent effusion, and if so, the emplast. cantharidis is a very effectual remedy. When the effusion still remains, and occasions urgent dyspnœa, then paracentesis should be performed. The operation is simple; the steps being as follows:—A slight incision is first made into the fourth or fifth left intercostal space, about an inch away from the sternum, and into this a trocar is introduced gently, so that the internal mammary artery may not be wounded. The immediate relief afforded is marked, and some permanent benefit ensues. as Roberts's statistics evince that of sixty recorded cases where the operation was performed, there were twenty-four recoveries. It is necessary after paracentesis to support the patient by nourishing soups and wine. In *idiopathic pericarditis*, occurring in young and robust persons, treatment is more active, as ℞ calomel. gr. ½, pulv. antimonialis gr. i. M. One such powder should be given every hour, and continued until slight salivation is made manifest. Then after the mercurial treatment is stopped, iodide of potassium should be prescribed in a bitter infusion (F. 5). *Locally* leeches are serviceable at the commencement of the attack, and when effusion exists a blister should be applied. When there is great depression of the system, wine or brandy is necessary with quinine. In the pericarditis associated with Bright's disease it is inadvisable to adopt the mercurial plan, but to rely upon the administration of stimulants at stated intervals.

ENDOCARDITIS.—By endocarditis is meant an inflam-

mation attacking the endothelial membrane of the heart. It is observed most often in a case of acute rheumatism; less frequently in the course of scarlet fever, measles, erysipelas, or pyæmia; occasionally it has been noted in acute and chronic Bright's disease, in syphilis, and after parturition. The endocardium, if seen in the early stage, is marked by increased redness and vascularity, and by an appearance of thickness and dulness. Later on, vegetations form and attach themselves to the valves of the heart, which become thickened and puckered or adherent to each other. Their healthy action is thus permanently impaired.

Symptoms.—Indications of its existence in the diseases mentioned may be shown by signs of general uneasiness about the heart, increase of fever, restlessness, and sweats. Subsequently a mitral systolic murmur is heard. In many cases the severity of the original affection masks the signs of endocarditis, and the permanent valvular mischief which it leaves is the only evidence of its having occurred.

The immediate prognosis is favourable.

Ulcerative Endocarditis.—This form of endocarditis begins with a sudden rigor—sometimes in rheumatic fever, after parturition, or in a case of chronic valvular disease. Its existence is evidenced by striking symptoms, viz. *gastro-enteric*, resembling those of typhoid fever, or *pyæmic*, with albuminuria, diarrhœa, and eruptions. It steadily progresses towards a fatal termination, and the diagnosis is difficult, unless the etiology, the character of the fever, and the occurrence of eruptions are carefully regarded, while the typical symptoms of typhoid fever or pyæmia are absent. Spleen greatly enlarged.

Treatment.—In endocarditis the treatment during the attack is similar to that of pericarditis. Rest in bed after the acute stage is essential. In ulcerative endocarditis the treatment can only be palliative.

Valvular Disease (Cardiac Murmurs).—On listening over the cardiac region in health, two distinct sounds are heard following each other at regular intervals.

These sounds have been termed first and second, systolic and diastolic, as the one corresponds to the contraction (systole), the other to the filling up (diastole) of the ventricles. The first sound has its maximum intensity at the apex of the heart; the second at the base, or, more accurately, on a level with the third rib and a little above and to the right of the left nipple, near the left edge of the sternum. In determining, therefore, the

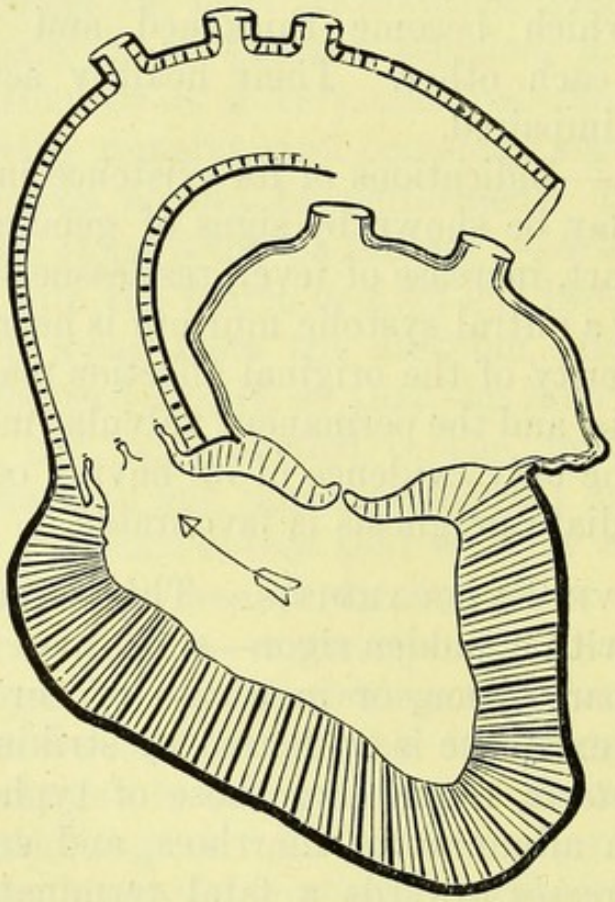


Fig. 9.—Ventricular Systole.

state of the heart, it is necessary first to apply the stethoscope at the apex and next at the base on the spots mentioned, and to ascertain whether or not a murmur or murmurs exist, denoting a variation from the sounds of health, and if so, what valve or valves are implicated. If of *exocardial* origin, as has been explained under pericarditis (p. 249), the sound heard is rubbing or grating. It is essentially superficial. It does not follow permanently either the systole or the diastole. It is irregular in point of time in the cardiac cycle. In order

to realise what is to follow, it is advisable to leave out of account the right side of the heart, and to fix the attention entirely on the left side, and more particularly the left ventricle, which has two valves in connection with it—the mitral and the aortic. With the contraction or systole of the ventricle (Fig. 9), the mitral valve is closed, to prevent blood flowing back into the auricle, and the aortic valves are laid back to allow it to go freely

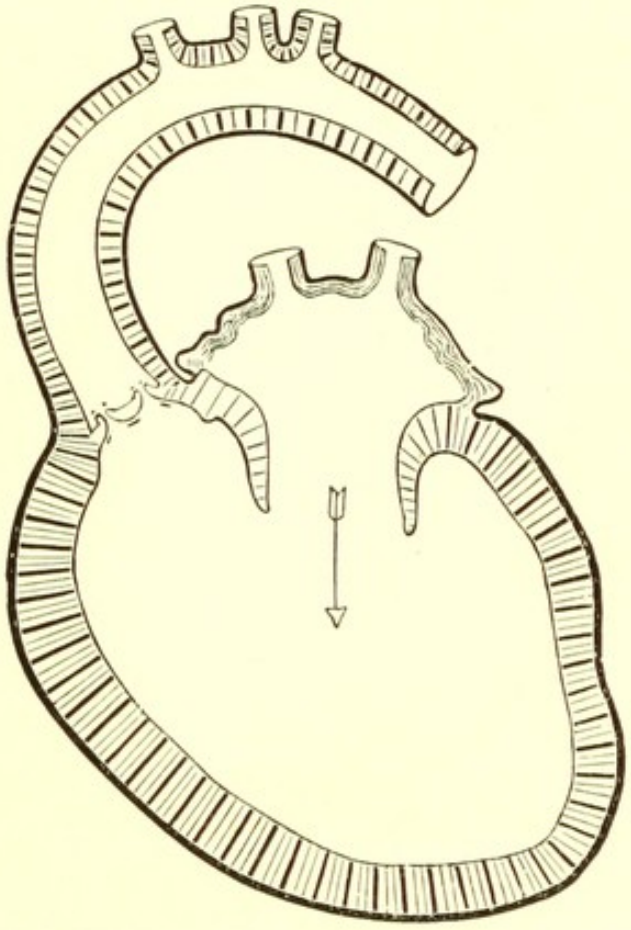


Fig. 10.—Ventricular Diastole.

away on its circuit. With the filling up or diastole of the ventricle, the reverse of this happens (Fig. 10); the mitral valve opens and the aortic valves are closed to prevent the blood flowing back from the aorta into the ventricle. If disease has involved one or more of these valves, interfering with their healthy action, a murmur or murmurs are occasioned, which may be considered "regurgitant" or "obstructive" according to rhythm or the time when they are heard; and thus we may have

one or more of four great classes of murmurs, viz. "mitral regurgitation," "mitral obstruction," "aortic regurgitation," "aortic obstruction." The further great practical facts may be dogmatised thus:—Mitral murmurs are heard loudest at the apex, aortic murmurs at the base. If a murmur is heard following the first sound, it may be termed generally a ventricular systolic (V. S.) murmur. If loudest at the apex and diminished or lost at the base, it is due to mitral regurgitation; but if loudest at the base, it is dependent on aortic obstruction.

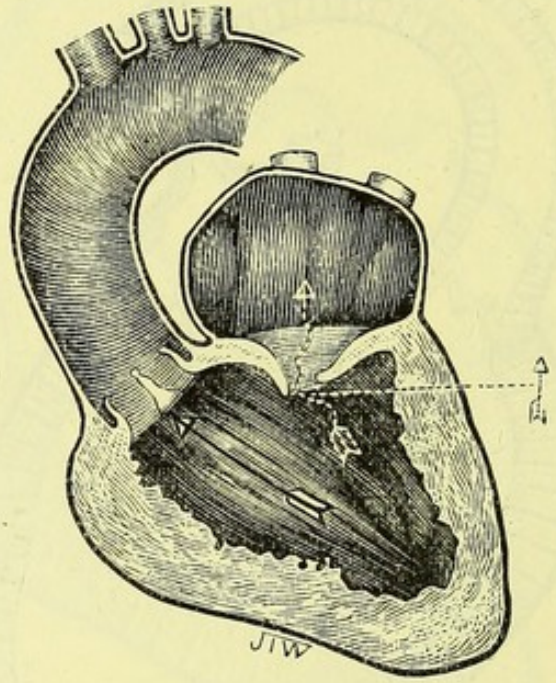


Fig. 11.—Mitral Regurgitation.

If a murmur follows the second sound, it may be termed generally a ventricular diastolic (V. D.) murmur, and as indicating its nature, aortic regurgitant. Again, a murmur may be heard following directly neither the first nor second sound, but immediately preceding the first; it may be termed auricular systolic (A. S.), or presystolic, or, as more definitely recognising its causation, the murmur of mitral obstruction.

Attention to these considerations will enable the student generally to detect the nature of the lesion, aided as he will be by the state of the pulse, which as a rule is soft

and compressible and jerking in aortic, often irregular and small in mitral obstructive disease; and by the pulmonary symptoms, which are more common and urgent in mitral, while cerebral symptoms or complications are more often associated with aortic disease. I purposely say nothing of diseases of the right side of the heart, as they are rare; and to enter completely into their causation would confuse the conception which it is desirable the student should retain of a single-chambered organ in connection with the subject of heart-murmurs.

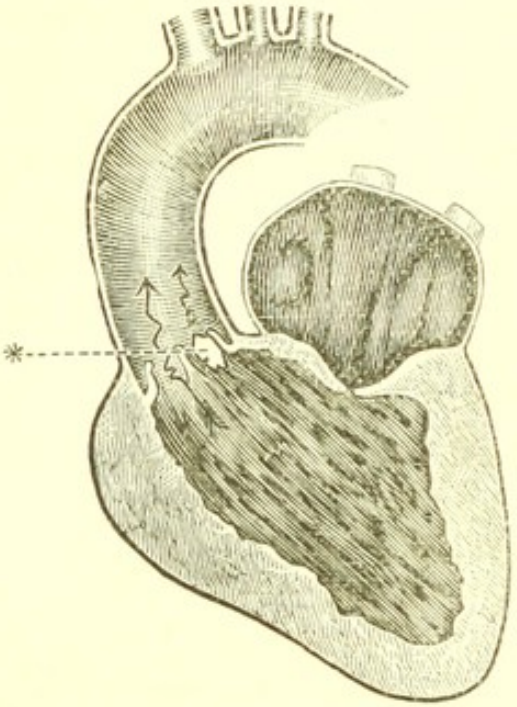


Fig. 12.—Aortic Obstruction.

The following tables, read, however, in connection with what has been said, can now be understood:—

A.—Mitral obstruction, stenosis, presystolic murmur, indicates an impediment to the flow of blood from the left auricle to the left ventricle. Recognised by a purring thrill at apex; a murmur running up to the first sound and loudest at apex; a feeble, often irregular pulse; difficulty of breathing after exertion. It occasions sometimes little uneasiness; sometimes pulmonary congestion and spitting of blood; sometimes it terminates in sudden death.

B.—Mitral regurgitation, incompetence, an imperfect

closure of mitral valve, permitting blood, during contraction of ventricle, to flow back to the auricle. Recognised by a blowing murmur following the first sound, and heard loudest at the apex ; diminishing towards or inaudible at the base ; confirmed by its being heard at inferior angle of left scapula ; pulse feeble and irregular. Caused by contraction or roughening of segments of valves ; by dilatation of left ventricle ; by irregular contraction of papillary muscles. Resulting in more or less suffering

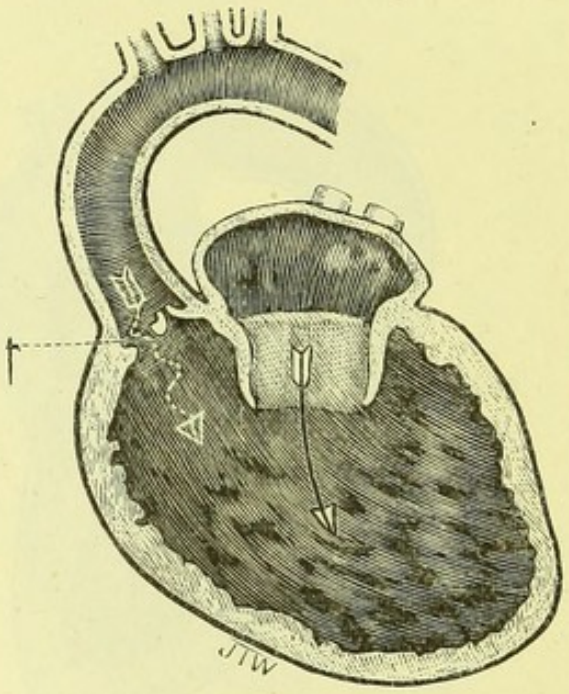


Fig. 13.—Aortic Regurgitation.

from congestion of lungs, liver, and kidneys : rarely in sudden death.

C.—Aortic obstruction, stenosis, narrowing of orifice, preventing blood flowing easily from the left ventricle into the aorta. Recognised by a murmur following the first sound, heard loudest at the base, always propagated to the vessels of the neck, and having its point of greatest intensity at the right border of the sternum in the second intercostal space, sometimes carried with considerable intensity downwards along the sternum ; pulse small, hard, and diminished in volume, in later stages soft and slow. Resulting often in little suffering

for years in consequence of compensating hypertrophy of left ventricle. But when compensation begins to fail there are frequent attacks of dyspnœa and hæmoptysis, and fits of faintness and dizziness from anæmia of the brain, the patient being conscious, but having no command of motor power. In contrasting it with mitral stenosis, the comparison is far more favourable with regard to the duration of life.

D.—Aortic regurgitation, incompetence, an imperfect closure of the aortic valves, causing regurgitation (V. D.) Characterised by a murmur accompanying the second sound, whirring, rushing, diffused more or less along the whole sternum, although perhaps loudest at the third right costal cartilage. If the insufficiency is very great, a reduplicated murmur, both systolic and diastolic, may be heard by pressure with the stethoscope when auscultating over the crural artery; while a shotty jerking pulse —*pouls de Corrigan*—is characteristic. This pulse is often called the "water-hammer pulse," or "pulse of unfilled arteries." So long as the increased force of the left ventricle suffices to prevent any stagnation of the circulation, there may be years of undisturbed good health; but when once compensation becomes imperfect, the reaction on the venous system—induced by the stagnation and the dropsy—leads to a rapidly fatal result, and sometimes it ends in sudden death. Sudden attacks of dyspnœa and oppression, a spasmodic pain beneath the sternum, are often observed; fainting and dizziness, indicating disturbed cranial circulation, are most unfavourable symptoms.

E.—Tricuspid obstruction: rare.

F.—Tricuspid incompetence (V. S.), regurgitation, imperfect closure of tricuspid valve. Recognised by increased dulness of right side of heart; diffused pulsation over the right ventricle, made visible to the eye by epigastric pulsation; murmur with the first sound; pulsation and fulness of jugular veins; dyspnœa and dropsy; generally associated with mitral regurgitation or emphysema.

G.—Pulmonary stenosis; rare (congenital).

H.—Pulmonary incompetence is also rare, and is detected by its situation over the pulmonary valves, by its loudness and non-propagation from this spot.

It must be remembered that these murmurs are frequently combined—the most frequent combination being aortic obstruction and regurgitation; mitral obstruction and regurgitation; various combinations of mitral regurgitant and aortic murmurs. These murmurs, which are

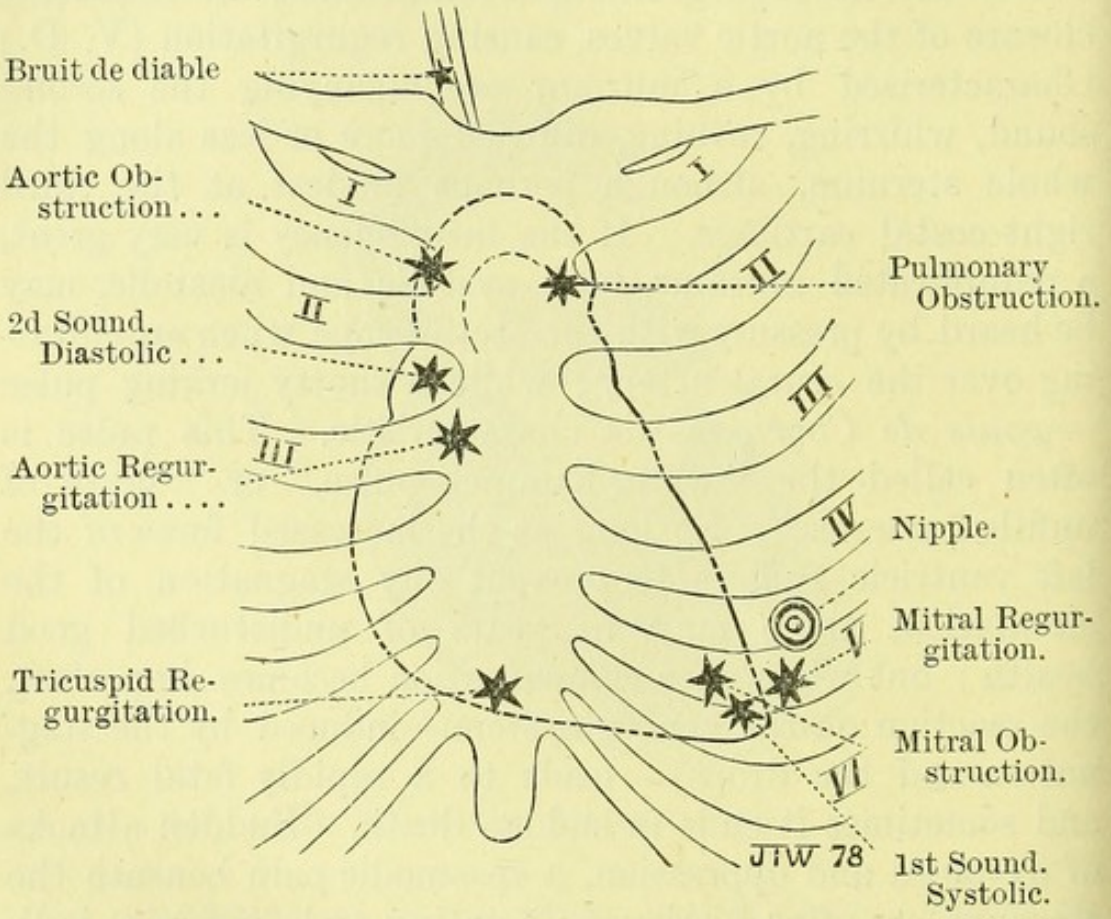


Fig. 14.—Auscultation of Heart Sounds. Points of Greatest Intensity of Different Murmurs.

termed organic, are permanent, and must be distinguished from another class of murmurs, denominated functional, inorganic, accidental, anæmic, hæmic murmurs. These murmurs are probably not due to an altered or anæmic condition of the blood so much as to an actual mitral incompetence induced by a flabby condition of the heart, which, in common with the whole muscular system, suffers from a defective nutrition. Functional murmurs are generally associated with chlorosis and other chronic

diseases leading to altered condition of the blood. They are also sometimes noticed in acute diseases, as pneumonia, typhus, scarlet fever, or small-pox. They are distinguished by the following considerations from the permanent or organic murmurs :—

1. They are soft, feeble, blowing; never harsh or rasping.
2. They are always systolic, never diastolic.
3. They are most frequently heard best over the pulmonary area, next at the mitral; very seldom at the aortic or tricuspid valve.
4. They are, especially in chlorosis, combined with murmurs in the veins of the neck.
5. If the health improves, they disappear.

ANY PRESYSTOLIC OR DIASTOLIC SOUNDS INDICATE ORGANIC CHANGES. The diagram on the preceding page indicates the points of greatest intensity of the chief murmurs indicated.

General Symptoms.—In any form of valvular heart disease, when compensation fails, when the heart's contractions are unequal for the increased labour, then certain symptoms appear evident to the sufferer. The relation between respiration and circulation is unequal, and the patient becomes breathless on increased exertion, as walking up-stairs or up-hill, and he has to stop breathing to recover the proper rhythm. This is termed cardiac dyspnœa.

Patients with heart disease also complain of palpitation, but it is to be remembered that this is sometimes only a symptom of flatulent derangement of the stomach. Yet when there is veritable heart disease the gastric symptoms also become very prominent, especially when the stomach is distended with food, which presses the diaphragm upwards against the heart, and thus acts mechanically in causing cardiac embarrassment.

Diagnosis.—The chief points to be attended to in forming a diagnosis as to diseases of the circulatory system are as follows :—

1. Apex beat of heart. Normal or abnormal. Impulse feeble or strong, or attended with thrill.

2. Auscultation. Normal: murmurs (functional or organic), systolic V. S. or diastolic V. S., or pre-systolic A. S., or exocardial, friction sound.

3. Percussion. Normal: area increased or diminished.

4. Pulse. Changes in frequency; rhythm, force, volume, tension.

5. General history.

Prognosis.—No very definite rules can be laid down in the prognosis of heart disease, unless accompanied by so many exceptional circumstances that they become valueless. While this is the case it may be said generally that tricuspid disease has the worst prognosis; next mitral regurgitant, next mitral obstruction, next aortic regurgitant, and lastly, the most favourable prognosis may be given in aortic obstruction.

Both forms of aortic disease are compatible with prolonged life and little suffering, the most favourable indications being that the second sound is heard over the carotids, and that the murmur is conducted to the left apex. This latter fact shows that the heart is not being robbed of its blood and consequent nutrition, as the aortic segment is non-coronary in its blood supply. When non-compensation exists in aortic cases, as evidenced by swelling of the feet and albumen in the urine, the disease marches rapidly to a fatal termination, this being rarely averted for more than fifteen months.

In mitral disease the symptoms of non-compensation are revealed by pulmonary embarrassment — dyspnœa, cough, etc., and the danger of cerebral embolism is always present. Yet with quietness and rest, and freedom from worry, both forms of mitral disease are compatible with long life.

In what class of valvular disease is sudden death most common? The broad answer is, In aortic disease more than mitral regurgitant. Mitral obstruction is, however, frequently terminated by sudden death through cerebral embolism, and this tendency is heightened if mitral regurgitation and obstruction coexist. In all the valvular diseases the Cheyne-Stokes respiration is a sign of death.

Treatment.—The cardiac tonics in use are digitalis, caffeine, strophanthus, and convallaria, which is non-official. They have all a distinct action on the heart and various secondary effects, as increase of blood tension and production of diuresis. From their similarity of action to digitalis they have been designated "the digitalis group." They are intimately associated with the treatment of diseased valvular conditions of the heart—in fact, treatment here depends chiefly on the apprehension of the nature of the lesion, the time of its discovery, and the giving or withholding of a cardiac tonic. A valvular organic murmur, single or combined, having been detected, all prophylactic treatment is valueless; and we possess no means of remedying what must be a permanent defect. *Post-mortem* appearances in heart disease indicate the compensatory efforts of nature to overcome or modify the various obstacles to, and deficiencies of, the proper flow of blood from the central organ. The indications of all well-directed treatment, therefore, are to follow the suggestions of nature, and assist the development of compensation when already in existence, to maintain it as long as possible, and to moderate over-compensation. Further, in affection of the aortic valves, clinical experience testifies that when the heart muscle is well nourished, and the bodily stamina maintained by a carefully regulated diet, avoidance of all unnecessary excitement, spirituous liquors, and smoking, perfect compensation may be maintained for years without any medicinal agent, and average good health may be enjoyed. When the mitral valves are implicated, the same average good health cannot be maintained, for there is always more or less pulmonary mischief revealed on exertion, or through fatigue or excitement, and nature cannot give compensation so complete as to obviate the phenomena of failing health. Hence, while the same precautions previously mentioned should be strictly, even more strictly enjoined, we should endeavour, on the first detection of mitral disease, whether obstructive or regurgitant, to assist nature's compensatory efforts by means of digitalis,

which has stood the test of a hundred years. When its administration is cautiously regulated in mitral obstruction, it will be found, without entering too minutely into the process, to increase the fulness and regularity of the pulse; to diminish the tendency to spitting of blood; to heighten arterial tension and counteract approaching dropsy. So also in mitral regurgitation, it dismisses the feeble irregular contractile efforts, and concentrates cardiac action in well-directed beats, and thus saves the over-distension of the right heart. In both cases it may be continued for a considerable time; but if the urine is found to diminish instead of increase somewhat in quantity, it is advisable at once to stop it, and to resume it again as circumstances and prudence may suggest. The tincture is the most convenient form for continuous administration, in doses of 5 to 10 minims, with a similar quantity of tincture of perchloride of iron. In the form of a freshly-made infusion of the leaves, in teaspoonful doses thrice daily, its diuretic properties, when these are chiefly desired, are more apparent, and it can be given in this way.

While it is inadvisable to give digitalis in the earlier stages of aortic disease, it will be found in advanced cases, when dropsy has begun, when the dyspnœa is intense, when the compensatory effort has been taxed to its utmost limit—theoretical considerations notwithstanding—that digitalis in infusion, with acetate of potassium, or in pill with squills and mercury, produces marked benefit. Probably this may partly be explained by the fact that in such long-standing cases all the valves of the heart are more or less involved. For, granting that the aortic valves were primarily diseased, we often see in this "stage of disturbed compensation," with the pulse low, the action of the heart irregular, and the urine scanty, that the diuretic value of digitalis is inestimable in these circumstances. Foreign observers speak highly of its combination with quinine, three grains of the sulphate being administered thrice daily, with from one to two grains of the powdered leaf. To promote cardiac and renal activity where digitalis causes gastric disturbance,

or, generally speaking, does not agree with the patient, the inhalation of compressed air, especially in mitral or aortic obstruction, has recently been strongly recommended. It is said that in such cases, when Waldenburg's apparatus is used, the pulse rises, and diuresis is established.

To ease also the irritability attendant on all forms of cardiac disease, and too surely evidencing exhaustion of the organ against mechanical difficulties, the application of cold to the region of the heart is useful. For this purpose, a metal or gutta-percha vessel filled with water or ice, and having a concave surface to fit in against the ribs, may be employed for two hours daily. To obviate the stagnation and slower circulation in the liver and abdomen seen in early stages, rhubarb with quassia or gentian may be prescribed; or, better still, if circumstances permit, a few weeks may be profitably spent in drinking the waters of Homburg or Kissingen, or bathing in the warm springs of Soden. Such means remove the complaint temporarily, and with renewed appetite there comes increased strength.

Next to digitalis, strophanthus is the most powerful and efficient cardiac tonic. It has this advantage over digitalis, that it does not create digestive derangements and does not accumulate in the system. It should be prescribed in the form of the tincture, at first in a dose of 3 minims, which may be subsequently increased to 10 minims in a wine-glassful of water thrice daily. The citrate of caffeine in doses of 2 to 10 grs. has relatively a more rapid action on the heart than either digitalis or strophanthus; its effects are like those of strophanthus, not cumulative, but the results are not always so permanent and satisfactory as with the two other medicines mentioned. Further, it should not be taken at night, as it is apt to cause sleeplessness. The disagreeable effects of caffeine on the central nervous system may be avoided by the use of sodio-salicylate of theobromine ("diuretin") in doses of 40 to 60 grains daily. When palpitation and dyspnœa are the prominent symptoms rather than deficient cardiac contraction, the fluid extract of convallaria

in 8 to 10 m. doses, thrice daily, seems to do good service. In advanced heart disease it is less powerful than the other cardiac tonics, but it appears to be more effective in functional disorders, as in anæmia or hysteria, and in the depression and irregularity caused by the excessive use of tobacco. Certain risks attend the administration of cardiac tonics in valvular disease of the heart.

I. The first great risk is from syncope. Whenever, therefore, cardiac tonics are given in full doses, and their action is systematically continued, the position of the patient should be *recumbent*. He should be helped to sit up in bed to take food, and should not rise unaided for the purpose of micturition. When given in smaller doses such precautions are not necessary.

II. Since the action of digitalis is cumulative, it is advisable not to continue, without a cessation of two days, its administration after the expiry of four weeks.

III. When the arterial tension is high, as in the case of heart disease associated with granular kidney, when there is evidence of an atheromatous condition of the vessels, and when the heart seems unable to propel the blood into the aorta, then cardiac tonics should not be given, for attendant on their use is the risk of an apoplectic seizure. Purgatives, diuretics, and diaphoretics should then be relied on. In addition we may state that it is inadvisable to give digitalis if (1*st*) it produces vomiting or giddiness; if (2*dly*) there is intermittency of the pulse, or if intermittency of the pulse or diminution of the urine is brought on during its use; (3*dly*), if the condition of fatty heart exists.

Casca bark in the form of tinctura erythrophlœi v. to x. m., sometimes relieves advanced mitral disease when other cardiac tonics fail. In cases of aortic insufficiency with dyspnœa and painful palpitation, an injection of pilocarpine frequently gives relief, or the same effect may be produced by taking about 60 grs. daily of powdered jaborandi, in divided doses. Supplementary to the

treatment mentioned are purgatives, as the compound powder of jalap, which may be given two or three times a week. If the kidneys are healthy, the "imperial drink," containing cream of tartar, is useful; so also is copaiba. Mercurials are not ordered when dropsy depends on kidney disease, but increasing testimony bears out the advisability of giving calomel in $\frac{1}{2}$ gr. doses, thrice daily, in cardiac dropsy. It seems, by relieving engorgement, to act as a diuretic. Oertel recommends systematic exercise in valvular heart disease, and this exercise, he states, should not be on level ground, but by oft-repeated and gradually-lengthened mountain-climbing. He gives direction for carrying out this method as follows :—

"With one step they (patients) must perform an inspiration, with the next an expiration in even time, and pursue walking and breathing in this way until they are forced to stand still, to bring into equilibrium the cardiac and vascular excitement, by deep inspirations. When the respiration is again free, if the violent palpitations of the heart are quelled, the patient resumes the ascent till the same phenomena force him to rest again. By perseverance in this method daily the respirations become freer and the disturbances of circulation less marked, so that a patient may be able to make an ascent up to 500 or even 1000 metres."

While this treatment may be guardedly tried in slight affections of the heart, it is certainly inadvisable where there is reason to suppose that the condition is one of fatty heart, or of weakness of the cardiac muscle, or of imperfectly compensated valvular disease. To attempt in such cases "to walk themselves into condition" would be to patients hazardous in the extreme.

Dietetics.—The diet in heart disease should be well regulated. The nutrition of the body acts on the nutrition of the heart, and the better the nutrition of the system generally is, the longer will the heart resist degeneration. As a rule substances tending to form fat should be avoided in the dietary of a patient with any form of heart disease. Sugar, starchy food, and sweet

vegetables should be interdicted; nitrogenous and albuminoid articles should be taken, but not in quantities which tend to overload the stomach. The use of alcohol, strong tea, coffee, or tobacco, is to be prohibited, more especially in lesions of the mitral valve. The bowels should be gently moved once daily. Straining at stool and lifting heavy weights are attended with danger. The body should be warmly clothed, and the passions and emotions kept under perfect control. Exercise daily without fatigue is permitted.

The question is often asked of the medical adviser, by parents or guardians of young persons who are the subjects of valvular disease of the heart—What kinds of exercise may be permitted? Until compensation is established, Dr. Mitchell Bruce says, "football and paper chases are to be entirely forbidden; whilst more or less 'stupid games' of cricket and tennis may be permitted. Swimming, whether in the sea, river, or swimming-pond, must be interrupted for a time; bicycling may also have to be interdicted unless the country be level and the boy's ambition moderate.

"When compensation has been completely established muscular exercise should be ordered, the amount and the kind depending upon the nature of the primary lesion. Dancing will have to be forbidden girls for a time, to be gradually resumed in the mildest form, under perfectly non-exciting circumstances."

DISEASES OF THE MUSCULAR SUBSTANCE OF THE HEART

HYPERTROPHY AND DILATATION

Hypertrophy of the Heart.—As a preliminary inquiry to the subject of hypertrophy of the heart and other cardiac affections, it may be asked, "What is the area of superficial cardiac dulness in normal cases?"

To answer this the student should percuss very carefully, employing pen and ink to dot out the results of his investigations on the chest. It will then be found that he has a map roughly triangular in form, the right side of the triangle being the mid-sternal line from the level of the fourth chondro-sternal articulation downwards; the hypotenuse being a line drawn from the same articulation to a point corresponding with the apex beat; the base being a line drawn from the site of the apex beat to the point of meeting of the upper limit of liver dulness and the mid-sternal line.

How are the valves situated in the area thus mapped out? FROM ABOVE DOWNWARDS THE PULMONARY COMES FIRST, THEN THE AORTIC, THEN THE MITRAL, AND LASTLY THE TRICUSPID; AND IN REGARD TO THEIR DEPTH FROM THE SURFACE, THE TRICUSPID IS THE MOST SUPERFICIAL, THEN THE PULMONARY, NEXT THE AORTIC, AND DEEPEST OF ALL IS THE MITRAL ORIFICE. Their exact anatomical arrangement is as follows:—The tricuspid orifice extends from the junction of the fourth left costal cartilage with the sternum, behind that bone to the articulation of it with the sixth right cartilage; the mitral orifice lies to the left of the tricuspid valves, immediately behind the fourth costal cartilage; the pulmonary orifice is situated immediately behind the left border of the sternum, at the junction of the third costal cartilage with that bone; the aortic orifice occupies the third interspace, and is about half an inch lower than and to the right of the pulmonary orifice behind the sternum.

These facts being remembered, to understand what is meant by the term hypertrophy of the heart, it is necessary also to have some definite idea of the size of the organ in health, and of the relative thickness of the walls of its different chambers. The size of the heart, all authorities seem to agree, is, in health, about the same dimensions as the closed fist, and it weighs 8 to 10 ounces. The left side of the heart has to do more active work than the right, and nature has accordingly provided

it with increased thickness of the muscular tissue to accomplish this. The relative thickness is as follows :— The right side is to the left as two to five ; or speaking generally, the thickness of the left ventricular wall more than doubles that of the right.

Hypertrophy of the heart is therefore most frequently

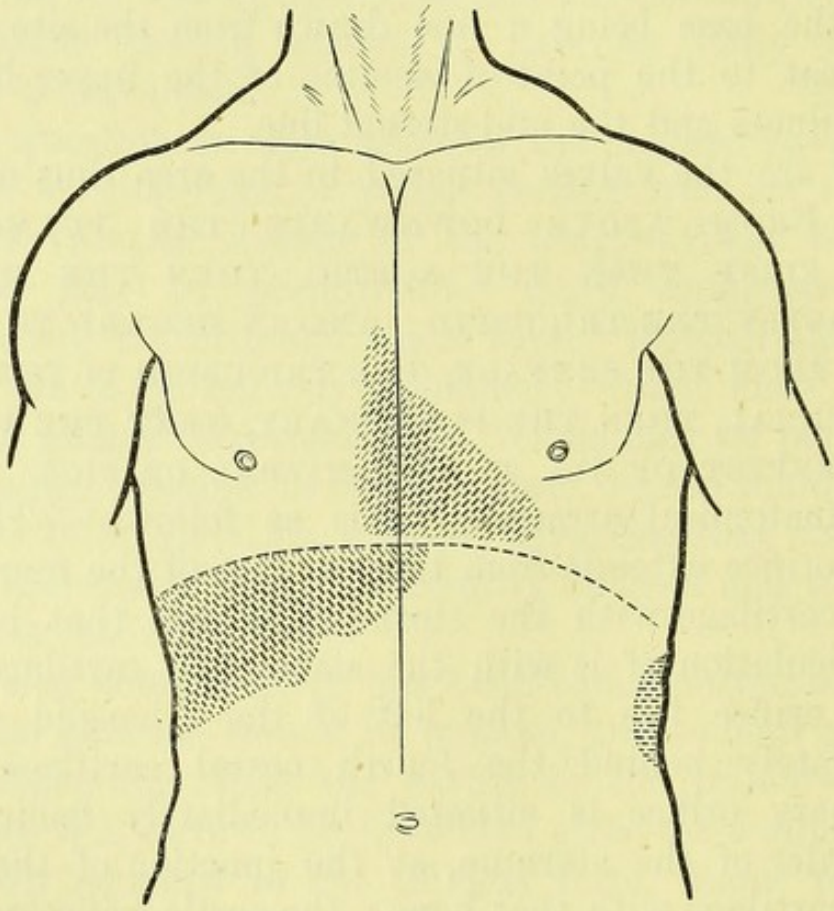


Fig. 15.—Areas of Cardiac, Hepatic, and Splenic Dulness.

found in the left side of the organ, or that side of the pump which has the most work to do.

This hypertrophy may be of two kinds. In the *first* there is simple enlargement of the muscular walls without dilatation of the corresponding chamber.

In the *second*, not merely are the walls thickened, but the chamber is also increased in size. The first is termed "simple" or "passive," the latter "active" or "eccentric." The first is rare, the second frequent. Dilatation and hypertrophy thus most frequently go together, and

the reason for this is obvious if we look at the condition that causes the hypertrophy.

Etiology.—In nineteen cases out of twenty there is some obstacle to the transit of blood to or from the organ. This obstacle may be in the heart itself, or may be due to its being pushed from its accustomed seat by disease of other organs, such as pleurisy. The former cause is the more common. Thus, if the aortic valves, which act as sentinels to guard and guide the blood from the ventricles, become incompetent, allowing the blood to flow back again, or obstructed, not permitting it to get properly out of the chamber, hypertrophy must result. The heart has to put on increased force to overcome the obstacle, and has to acquire increased space to contain the greater quantity now in the chamber. If the mitral valve is diseased, there will be an increased quantity of blood within the left auricle, and hence the chamber must be larger. The auricular action is not, however, so forcible as the ventricular, and as there is not so much increase of power needed, auricular dilatation often exists without hypertrophy.

On the right side of the heart we find increased size and thickness of the right ventricle, where there is some obstacle or too great patency in the pulmonary or tricupsid valves, or some hindrance in the diseased state of the lungs to the proper circulation of the blood, as from emphysema. But cardiac hypertrophy, apart from kidney or lung disease or valvular derangement, may arise from over-exertion of the organ (see Irritable Heart, p. 277); from excessive smoking and liver congestion in persons of sedentary habits who live too freely; and occasionally from the effects of acute rheumatism, without any disease of the valves.

Symptoms.—In general the symptoms are developed slowly. They may be broadly enumerated as follows:—dyspnœa, palpitation, pain localised about the heart, and inability for active exertion, such as walking, running, or going up stairs quickly. Symptoms of granular kidney disease, more particularly alluded to at p. 394 *et seq.*,

will also often be observed. The pulse is usually strong, powerful, and jerking; but it varies with varying causes. Patients suffering from severe dilatation and insufficiency of the auriculo-ventricular valves of the heart sooner or later present signs of venous congestion in the lungs, liver, spleen, or kidneys; and dropsy of the subcutaneous tissue beginning at the lower extremities, but involving at an early date parts like the scrotum and the eyelids, which afterwards is followed by transudation into serous cavities such as the pleura or peritoneum.

On percussion, the area of cardiac dulness is found to be increased. The direction of the increased dulness varies according to the part of the heart affected. If it be the left ventricle, the extension will be downwards and to the left, giving an elongated shape; while, if the right ventricle be hypertrophied, it comes to form the apex, and thus the outline is square, and the dulness extends to the right. There is a sensible and very distinct heaving impulse communicated to the hand or the stethoscope. The heart-sounds are heard over a largely increased surface, and the apex-beat is carried lower down, and to the left of its normal position. Further, if the hypertrophy be *simple* with little or no dilatation, the first sound is often dull and muffled. Dr. Walshe described it as "prolonged" and "weakened," the sensation borne to the auscultator's ear being rather "one of impulse than of sound." When dilatation and hypertrophy exist together, the first sound may be loud, full, and pronounced, but with dilatation alone the condition of the heart is soft, and the first sound may thus be very weak and faint; while, should there be valvular disease, murmurs will be heard, varying as to site and peculiarities with the valve implicated. If we consider that hypertrophy and dilatation generally coexist, a practical summary of the two conditions may be expressed thus: IF THE HYPERTROPHY IS GREATER THAN THE DILATATION, THE DULNESS OF THE HEART IS CHIEFLY INCREASED FROM ABOVE DOWNWARDS; BUT WHEN THE DILATATION IS IN EXCESS, THE DULNESS IS GREATER TRANSVERSELY.

Treatment.—Slight hypertrophy requires little treatment, for when the cause of the hypertrophy is removed, the affection ceases to be troublesome. In advanced cases, the indications of treatment are to relieve as far as possible the ventricles of work, and increase the vigour of their action, and at the same time to deplete the venous engorgement. Hence six or eight leeches should be applied over the liver and the bleeding aided by hot poultices. Internally a dose of calomel or blue pill in doses of from one to five grains is preferable to other purgatives. A moderate dose of these should be given every third night with a diuretic mixture during the day. The heart being relieved of work, may be urged to more vigorous action by special heart tonics, such as digitalis, strophanthus, or caffeine, with which strychnine may be combined with advantage.

Dietetic Treatment.—The dietetic treatment referred to at p. 267 is here applicable with these adjuncts. If the patient is of full and plethoric habit we should restrict the use of rich food, all alcoholic stimulants, tea or coffee, and the abuse of tobacco; if the patient is of weak and feeble frame, we should order a diet which strengthens and gives tone to the system.

ATROPHY OF THE HEART.—In contradistinction to hypertrophy or enlargement of the heart, with increase of the muscular substance, we sometimes find the heart atrophied or diminished in weight. The muscular substance becomes pale, soft, and flabby, and easily broken down. The normal weight of the organ may thus be reduced to one-half, and its chambers are small.

The simple form of atrophy is the result of debilitating disease, such as fever, cancer, marasmus, phthisis; or it may be congenital; or caused by disease of the vessels which nourish the heart's substance — the coronary arteries. It is thus rather a post-mortem appearance than a distinct disease.

Symptoms.—If there is marked diminution of the size of the heart, the area of cardiac dulness will be decreased.

The smaller quantity of blood contained in the cavities, and the feebler contracting power of the organ, will render the impulse weak and the heart's sounds indistinct. The pulse will also be found to be small. There are, however, no certain diagnostic signs.

Fatty Degeneration of the Heart.—There is another form of atrophy in which the muscular texture becomes altered by fatty degeneration. The term fatty degeneration does not imply that the heart is overloaded with fat, and has on its outside, or even dipping in between its muscular fibres, an increase of adipose tissue. This is rather a deposition and infiltration of, than a degeneration into, fat, and is better termed a fatty growth —a something superadded. What is meant by the term "fatty degeneration of the heart" in reality is, that the healthy transverse striæ and nuclei of the muscular substance are obscured by groups of fat granules. The muscular fibres are soft, easily broken, and some authorities (Dr. Quain, etc.) have pointed out that there is frequently ossification of the coronary arteries.

It will thus be observed that fatty degeneration differs from a fatty infiltration of the heart. The latter is generally associated with general obesity, and the fat normally deposited on the heart is then increased abnormally, especially on the surface of the right ventricle. Fatty degeneration comes on at all ages, but is most frequently observed in males of advanced life. The *prognosis* is unfavourable.

Symptoms.—The principal symptoms are a slow feeble action of the heart, with weakness, giddiness, faintness, and a pulse varying from 45 to 50 beats per minute. A peculiar diagnostic sign is the *arcus senilis*, which is due to fatty degeneration of the margin of the cornea; yet it must be remembered that we may have fatty degeneration of the heart without the arcus senilis, and *vice versâ*.

The *Treatment*, from the nature of the affection, can only be palliative.

ANGINA PECTORIS.—To a disease exhibiting many uniform and characteristic symptoms, and usually considered as depending on some structural derangement of the heart, Dr. Heberden in 1768 gave the name of Angina Pectoris (the breast pang). It is a disease of middle life or advanced age, and is more common in men than women. In its well-marked and typical form, fortunately, the disease is rare.

Symptoms.—The first attack is sudden, usually coming on when the patient is walking up a hill or against the wind shortly after breakfast, or it may occasionally be experienced for the first time when a person, who has never before suffered from it, is awakened by it from his sleep. The pain is referred to the sternum, a little inclined to the left side, from which point it shoots across the breast to the left arm, and appears to terminate at the elbow. In some cases it extends to the right breast, and passes down the right arm in a similar manner. The pain is accompanied with a feeling of suffocation and dread of impending death. The countenance is pale and covered with sweat; the pulse is more or less small and feeble; while consciousness is unimpaired. At first the paroxysms last only a few minutes, and recur only at long intervals. Gradually they lengthen and recur with increased frequency, being evoked not merely when walking, but when sitting or lying down, and by the slightest bodily exertion or mental anxiety.

Etiology.—Some consider it merely neuralgic, commencing for the most part in the pneumogastric nerve, and spreading in different directions. Militating against this theory is the fact that it seems to be brought about by what disturbs the heart's action, viz. mental emotion and bodily exertion, and especially that it is so often *suddenly fatal.* Dr. Jenner, the discoverer of vaccination, in 1778 attributed it to obstruction of the coronary arteries, this obstruction being due to ossification in nearly their whole length. This view he expressed in a letter to Dr. Heberden, and with touching kindness desired him not to publish this opinion, lest it should

affect the health of John Hunter, the anatomist, who suffered from angina pectoris.

We now know that occasionally the coronary arteries have their orifices more or less obliterated by disease of the aorta itself, their coats in the rest of their course being quite healthy. The disease of the arteries does not, however, account for the sudden pain. Generally speaking, it may be said that ossification or obliteration of the coronary arteries, fatty degeneration, deficiency of blood supply, chronic inflammatory change of the coat of the aorta at or near its origin, leading to atheroma, calcification, or even small aneurysms, are usually, if not always, present in dangerous and typical cases of angina pectoris.

Prognosis.—This is, from the nature of the disease, grave. Amendment may for a time ensue, but sooner or later death occurs in the course of a paroxysm.

Treatment.—There can be little doubt that the inhalation of nitrite of amyl is the best remedy for the paroxysm of angina pectoris. The inhalation of two to three drops relaxes the increased arterial tension, and in a few seconds causes the face to flush and the head to feel full. The heart seems to give one strong beat, and from a condition of perfect agony there may be, in a moment, complete repose. The instantaneous relief experienced by its use has induced many patients to carry about with them glass tubes of nitrite of amyl,—each containing 4 minims,—and at the slightest warning of an attack, to break one, and inhale the amyl sprinkled on a handkerchief. Comparative freedom from attack is thus enjoyed, and walking exercise may be cautiously tried.

While nitrite of amyl is probably the readiest way of cutting short a paroxysm, yet for preventing the recurrence of seizures nitro-glycerine is the best remedy. In beginning the treatment it is advisable to commence with 1 minim of Liquor Tritnitrinæ, and gradually to increase the dose to 10 minims regularly every three hours, or by taking in similarly increasing doses Tabellæ Nitro-Glycerini. In many cases after a time the patient

is able to leave off taking the remedy, and may walk with ease up-hill. While this, happily, is often the result of the nitro-glycerine treatment, yet it is to be remembered that in this disease rest is an essential therapeutic agent. And cardiac rest is best obtained here by a tranquil life and by using moderately, if not abstaining from, alcohol and tobacco, and removing all constriction in dress from the neck and abdomen. Common sense and prudence should prevent a patient courting a paroxysm by walking against the wind, or struggling to ascend a mountain. Previous to the introduction of the nitrite of amyl or nitro-glycerine treatment, liq. arsenicalis was considered the best internal treatment by Dr. G. W. Balfour, while chloroform inhalation was used for the immediate paroxysm. Nitrite of sodium seems to have an effect similar to that of nitrite of amyl.

Cardiac Pain.—Functional pain of the heart sometimes creates great anxiety on the part of the patient. The usual site is a little outside the nipple, and the pain is described as being sharp and cutting or dull and heavy. It may radiate over the side of the chest to the neck, the axilla, and left arm, and it is generally paroxysmal in character. Dr. Walshe described a cardiac pain which occurs when the patient bends forward as in pulling on his boots. The explanation of this circumstance is probably afforded by the upward pressure on the heart through the diaphragm, or it may be regarded as a form of angina pectoris.

Irritable Heart.—This condition is sometimes seen in young recruits, or in civilians who go into active volunteer service without previous training. The weight of the accoutrements is found to be too heavy, and there is a sharp sudden pain in the cardiac region, with palpitation, dyspnœa, and increased frequency of the pulse. The distress is at times so great that men have to discontinue drill, or if on a march, have to drop out of the ranks. Most of these cases yield to rest and regulation of the diet—abstaining especially from excess in tea, tobacco, or

alcohol, and all forms of excitement. In other cases it seems not so easily conquered, and gives rise to cardiac hypertrophy.

PALPITATION OF THE HEART.—There are few sensations better known, and which create at the same time more anxiety, than that to which the term palpitation is popularly applied. In a state of health, and even in many forms of disease, the natural cardiac movements take place imperceptibly. When they are, from any cause, markedly increased and perceptible to the individual, he is said to have palpitation; which again, if sharp and strong, is termed *throbbing*; if soft and feeble, *fluttering*. As a matter of practice, a distinction must be drawn between *permanent* and *occasional* palpitation. The former almost always accompanies organic disease, but more frequently the latter is merely the evidence of nervous and sympathetic disturbance; and to the causes of this attention will now be directed.

1. Strong emotions of joy or sorrow notably influence the actions of the heart, and from these causes palpitation is frequent. Palpitation is often noticed in persons of an irritable disposition, and is observed in such conditions as chlorosis or hysteria.

2. Palpitation may be the result of a full habit of body. Over-distension of the cavities results, and when exercise by such a person is taken, palpitation becomes a prominent feature, through increased velocity of the blood.

3. Palpitation may arise in males from indigestion, constipation, smoking, strong tea, or alcohol; and in chlorotic females when liquid in any form is taken.

4. Not infrequently palpitation is simply the evidence of a system exhausted by over-study, by mental anxiety, by want of sleep, and by lack of rest or recreation.

Diagnosis.—All the circumstances mentioned must be considered in establishing a diagnosis between palpitation and organic lesion of the heart, as hypertrophy. In both there are violent movements of the organ against the walls of the chest. But in simple palpitation the impulse

is confined to the proper region of the heart, and does not extend to the back nor to the right side. It is also unaccompanied by lividity of the lips or œdema of the limbs. If the complaint occurs in young women the pale bloodless aspect of the countenance will aid, with accurate percussion of the cardiac region, in settling the nature of the disease.

Treatment.—In cardiac pain or in irritable heart the benefit from the use of digitalis is marked. Other remedies which may be of service are bromide of potassium, spiritus ætheris compositus, and in females of a hysterical condition asafœtida and valerian. When immediate relief is necessary, from depression, irregularity, and intermittence of the pulse, then the quickest and the best remedy is a tablespoonful of brandy. When the excitement is thus relieved, then digitalis regularly administered will be found to steady the heart's action; and when there is intermittence of the pulse, belladonna or atropine is useful.

In palpitation arising from such various and even distinctly opposite causes as have been mentioned, the particular circumstances of each case must be met by appropriate measures. When plethora exists, then a low diet, cathartics, and a course of saline waters, as at Kissingen, Homburg, or Marienbad, are useful. When, on the other hand, the palpitation is an evidence of weakness, then tonic treatment, in the broad meaning of the term, is necessary. After the bowels have been acted on by a warm aperient, such as the compound decoction of aloes, the general habit is to be strengthened by quinine and iron, by nourishing diet, by exercise in the open air, and by cheerful amusements. In such cases the bracing atmosphere of St. Moritz, Tarasp, or other Swiss health-resorts at high altitudes, is very valuable. The habit of excessive smoking, or drinking strong tea or stimulants, must be moderated, and in some cases altogether abandoned. When the palpitation is very severe, Schroetter recommends iced cloths, and the hypodermic injection of morphine in the cardiac region.

DISEASES OF THE BLOOD-VESSELS

DISEASES OF THE ARTERIES

Diseases of the arteries may be acute or chronic.

Acute Arteritis.—Though acute idiopathic arteritis does not exist, yet inflammation of an artery may be produced by an injury; by the formation of a thrombus, or impaction of an embolus; or by extension from surrounding parts. In the latter case, though the outer arterial coat is first affected, yet, if the inflammatory process goes on, it may extend to the inner coat and produce thrombosis.

Chronic Endarteritis.—Chronic endarteritis chiefly affects the deeper layers of the internal coat, and arises from mechanical strain or syphilis. Any strain which raises the blood-pressure in heart or kidney disease may initiate changes of the larger arteries termed chronic endarteritis, or atheroma. Syphilis occasions endarteritis by thickening of the artery and by diminution of its calibre.

Atheroma, attacking the larger vessels of the trunk and limbs, and those at the base of the brain, leads to serious issues. The elasticity of the vessel is impaired, and imperfect nutrition of the parts supplied by it is produced. Three stages are recognised:—

1*st*, In the first stage grayish patches are observed when the vessel is slit open. They appear to be on the surface, but really are situated between the tunica interna and the tunica media. In consistence they are semi-cartilaginous, and are the result of an inflammatory change producing a proliferation of cellular elements.

2*d*, In the second stage, fatty degeneration of the cellular elements has taken place, and the diseased patch is now a yellowish pasty mass. Its resemblance to meal led to the designation "atheroma," from ἀθήρη, meal. From the pasty stage there are two terminations:—(*a*) the endothelium may give way, leaving an excavation, whose floor is formed by the

middle and external coats of the artery ; (*b*) in other instances, instead of an excavation, there is a hard calcific deposit which may be termed

The 3*d* stage of atheroma. Bony plates without the minute structure of bone are observed at intervals on the arteries, and sharp spiculæ project into the interior of the vessels. In the aorta these bony plates may be seen in sizes varying from an inch to half an inch long ; and in the smaller arteries the calcific matter forms a distinct ring round the vessel. Sometimes when the pasty changes are washed away, the blood exudes into the substance of the middle coat of the artery and forms a *dissecting aneurysm* ; or when an atheromatous ulcer develops, the vessel is much weakened at this spot and gives way, and so a *sacculated* aneurysm, or even rupture, occurs "if the external coats have not been much thickened by the formation of inflammatory tissue in them."

Diagnosis.—The disease can hardly be suspected before middle life, and though the feel of the radial pulse may, to the inexperienced, give the idea of a strong circulation by its fulness and rigidity, this impression is corrected by a sphygmographic tracing, which reveals in atheroma the upstroke vertical and the summit of the tracing extended (see p. 247).

Treatment.—Treatment is mainly preventive. Should an atheromatous condition be suspected it must be our effort to prevent any cause operating so as to produce a hasty termination. Thus alcohol must be avoided, venereal excesses countermanded, prolonged and exciting muscular efforts forbidden. In the case of the brain all things should be excluded which may produce congestion, as mental effort or sleeplessness. In the case of the heart any condition should be guarded against which leads to distension of the right ventricle, and imposes an obstacle to the return of blood, as in strains which involve holding in the breath.

PERIARTERITIS.—This is a term applied by Charcot and Bouchard to inflammation of the perivascular sheath, which, spreading from without inwards, ultimately embraces all the coats of the vessels, giving rise to miliary aneurysms. These aneurysms, and not atheromatous disease, are stated to originate cerebral hæmorrhage.

Fatty Degeneration. — This condition is rare. When it does occur, velvety spots are observed on the internal surface of the artery affected. Erosion follows, which leads to the rupture of the middle and external coats.

Calcification or Primary Calcareous Degeneration. — Carbonate and phosphate of lime are here deposited in the middle coat of those vessels in which muscular fibre is abundant. It is a senile change, rarely seen, and affects the superficial vessels and arteries of the brain.

Arterio-Capillary Fibrosis is, according to Sir William Gull and Dr. Sutton, a disease of the small arteries, leading to hypertrophy of their coats, and attendant on the cirrhotic form of kidney disease. A diversity of opinion exists as to which coat of the arteries the hypertrophy attacks. Gull and Sutton believe that the external coat is the seat of fibroid thickening, and they further state that this is not caused by the coexisting disease of the kidneys, but that both are parts of a general diseased process. Dr. George Johnson, on the other hand, considers that hypertrophy attacks especially the muscular coats of all the tunics of the small arteries, and is a direct result of the obstruction which impure blood invariably meets with in the capillaries in the form of Bright's disease mentioned.

Aneurysm.—Atheromatous or other morbid changes lead to dilatation and aneurysm. In some cases the aneurysm is observed where disease has sapped the inner coat, and afforded a pouch for the dilatation of the vessel. At other times the dilatation does not occur there, but at a spot nearer to the heart. This is doubtless due to a slowing of the blood stream at the seat of the disease leading to increased arterial tension on the proximal side, where the aneurysm develops.

Gummatous disease is referred to at p. 98.

ALBUMINOID OR LARDACEOUS DISEASE.—This condition is observed in the vessels of the kidney, the liver, and the spleen, but not in the larger arteries of the system.

Following on deficient innervation, DILATATION AND CONTRACTION OF ARTERIES are sometimes seen without any degeneration of their coats. In the brains of the insane are detected alterations in the arteries, which possibly result from obstruction to their ultimate ramifications.

THORACIC ANEURYSM

Those dilatations which are termed aneurysms affect at one time the whole of the artery for a certain distance, and at others only a portion of its circumference, and they may be cylindrical, spindle-shaped, or sacculated. In size they may vary from that of a pin-head to that of a man's head, and their walls are almost constantly formed by the diseased arterial coats. Frequently the three coats are distinctly recognisable; at other times only one or two can be distinguished. The external coat usually survives longest, while the inner or middle coat is the first to give way. The cavity of an aneurysm rarely contains blood in a fluid condition only; usually there is more or less of a fibrinous coagulum deposited in layers over the lining membrane, and sometimes, by this coagulum becoming converted into fibrous tissue, the sac may be filled up and obliterated.

In the great majority of cases the formation of an aneurysm depends on an alteration of the middle coat of the artery—this alteration being the result of atrophy or fatty degeneration. With this general cause many accidental causes may unite in producing an aneurysm. Thus, in vessels already diseased, a fall, a blow, or any violent exertion, may rupture a few fibres or laminæ, and may suffice for the commencement of further dilatation.

Unless due directly to mechanical injury, aneurysms are of most frequent occurrence in middle and advanced life; before the twentieth year aneurysms of the large

arteries are very rare. They are more frequent in men than in women, and a laborious occupation or violent athletic exercise tends to their development. The disease is comparatively rare, and its frequency varies in different countries. It is most common in England. In Germany it is less common than in France, and in Italy it is very rare.

Sites.—There are three chief situations for thoracic aneurysms, which are usually confined to the aortic arterial system, and are seldom observed in the pulmonary artery, viz. the ascending portion of the aortic arch, the transverse part of the arch, and the roots of the large vessels arising from the arch. Most frequently they spring from the ascending arch, and from the convexity rather than the concavity.

Aneurysms of the arch embraced by pericardium are always small in size, and are usually associated or confounded with simple aortic valvular disease. When the aneurysm is situated beyond the pericardium, it frequently attains a very large size, displacing the lung outwards, especially on the right side, and coming in contact anteriorly with the thoracic wall, where it may ultimately form a visible pulsating tumour. In the interior of the chest it presses on the right lung, and may compress the descending vena cava, and involve the right pneumogastric nerve. An aneurysm in this situation is liable to open either externally or into the pericardium or the right pleura, or the lung itself; an aneurysm of the transverse arch springing from its convex portion spreads upwards and to the left, pressing upon the manubrium sterni, the left clavicle, and the left upper ribs. A tumour is thus formed in the region mentioned, which sometimes rises from the sternum into the root of the neck. If it springs from the posterior surface of the transverse portion of the arch, its course is often latent.

Aneurysms of the descending part of the arch are rarely to be detected until they have attained a large size, although their presence may be suspected if we find dulness, pulsation, murmur, absence of respiration over a

limited area, and dull aching or burning pain over the vertebræ.

The exact anatomical relations of thoracic aneurysms of moderate size may thus be summarised :—

1. Aneurysm of the ascending aorta (the most common variety) forms a pulsating tumour in the second right intercostal space near the sternum.

2. Aneurysm of the transverse part of the aortic arch is situated at the level of the manubrium sterni, but reaches to a variable distance to the left of that bone, according to the size of the swelling.

3. Aneurysm of the descending aorta renders prominent a part of the left posterior surface of the thorax in the neighbourhood of the lower dorsal vertebræ.

General Symptoms.—When the tumour can be detected externally, the diagnosis is easy, but if this is not the case the symptoms are obscure. Generally speaking, an aneurysmal patient suffers from cough, dyspnœa, difficulty in swallowing, and pain about the chest and back. The pain is usually dull and heavy, but occasionally it occurs in paroxysms, and is boring and pulsating, and may be increased by mental emotion. With the pain there is often a feeling of tightness of the chest simulating that of angina pectoris. The cough is audibly brassy in character, and attended with a suffocative feeling, by aphonia, and paralysis of one or both vocal cords, if one or both recurrent laryngeal nerves are implicated ; and if the tumour extends deeply backwards, so as to press on the ganglia and branches of the sympathetic, there will be permanent *contraction of the pupil* of the affected side.

The physical signs are dulness, "bruit," absence of respiration, or bronchial respiration from pressure on a bronchus. Again, if the transverse part of the arch be the seat, the tumour or pulsation may be felt by placing the finger deeply in the supra-sternal notch. Heart murmurs and pain, or numbness of the arm or side, serve to confirm our diagnosis.

The duration of the disease is uncertain. In thirty

cases collected by Lebert the disease lasted from one year to four years. The disease seems to make more rapid progress in young people than in old. The prognosis is necessarily very unfavourable.

For treatment, see p. 287.

ABDOMINAL ANEURYSM

Aneurysms of the abdominal aorta are more frequent above than below the cœliac axis. They are spindle-shaped or saccular (from three to six inches in mean diameter), and often of very considerable size, the contents sometimes weighing as much as ten pounds. They project from the anterior surface or sides of the artery, and tend to develop downwards and to the left more than upwards and to the right because of the liver and the diaphragm.

Symptoms.—A tumour is usually found to the left, just above the navel. On palpation a forcible pulsation is perceived a little after the apex beat and accompanied with a thrill, and along with this thrill a murmur is heard. The pulsation is almost always single and synchronous with the radial pulse; it is limited to the tumour, and is occasionally accompanied by thrills. A murmur in the recumbent position is rarely absent; it is systolic in character, single, blowing, and prolonged. It is rarely transmitted into the vessel beyond. If the aneurysm is situated high up it cannot be palpated, and we can only perceive the pulsation communicated through contiguous parts (liver, spine, etc.) and hear the murmur similarly propagated.

Functional disturbances may also be present in a greater or less degree. The most common of these is pain in the belly and in the back, corresponding to the seat of the tumour. There may also be vomiting, diarrhœa, or constipation.

The general condition of the patient may remain unaltered for some time, or there may be progressive debility. Rupture of the aneurysm is frequent, giving rise to acute

peritonitis or death from internal hæmorrhage; or sometimes an aneurysm of this kind may burst into the left pleural cavity.

Diagnosis.—Abdominal aneurysm is difficult to diagnose, for it is simulated by various conditions, as hysteria, uterine or intestinal irritation, dyspepsia, cancerous or other tumours. The leading points in abdominal aneurysm are—

1. Localised throbbing, unassociated with the general symptoms of the diseases mentioned. In these diseases the pulsation is not localised, but may extend to the main arteries of the lower limb.

2. Examination under chloroform will show whether the aorta is normal.

3. In the prone position an abdominal tumour will gravitate away from the aorta, and, although a murmur may be produced with strong pressure of the stethoscope, it does not exist when that pressure is withdrawn.

4. The fixed local pain in the back, aggravated by pressure and motion, may be simulated by spinal rheumatism, but the absence of other local signs of a tumour differentiates this from aneurysm.

Treatment.—The general treatment must be that advisable in all forms of cardiac disease, viz. rest, and avoidance of all excitement, mental or bodily. Probably Tufnell's method in thoracic as in abdominal aneurysm is the best, the principle being the giving of a spare dry diet, and the enjoining of strict and absolute rest in the recumbent position. Hence he orders six ounces of milk, two ounces of roast meat, and six ounces of bread and butter daily. By this means the blood tends to coagulate in the sac; just as the passage of a comparatively sluggish stream of water through a pool affords every opportunity for the accumulation of débris on the banks, so in this way, at the sides of the aneurysmal sac, fibrin becomes accumulated in layers and ultimately is moulded into the walls of the sac.

Of medicinal agents, iodide of potassium, in large and increasing doses to the extent of 90 grains daily, is held

most in repute. This drug has the support of eminent English and foreign authorities. The use of the Injectio Ergotini Hypodermica is also recommended. Ten minims may be injected in the immediate neighbourhood of the tumour, at intervals varying from half a day to several days. The object of this is to diminish the sac by producing contraction of its muscular elements, and the tumour is said to become gradually small and hard, and the pulsation to disappear.

Galvano-puncture in some cases has been successful, the object being to produce coagulation of the blood in the sac. Under favourable circumstances one single electro-puncture may be sufficient; in others, it may require to be repeated after a lapse of some weeks. It is essential that the strength of the current be determined before application to avoid shocks, and that the needles should be introduced so that they shall not come in contact with each other. If these rules are observed no evil results need be anticipated. Out of twenty-three cases related by Ciniselli, five were cured; and he states "that the mechanical action of the needles is combined with a chemical action produced by the electrolytic decomposition of water and of the salts of the blood." Dr. Wm. Macewen of Glasgow has suggested a more simple surgical procedure by simply scratching the inner coat of the tumour.

DISEASES OF THE VEINS

The diseases of the veins comprise inflammation, varix, wounds, air in veins, hypertrophy, atrophy, phleboliths (venous calculi), parasites. Some of these conditions will be briefly mentioned.

1. Inflammation. This may be from within or from without, constituting in the former case Endophlebitis, in the latter Periphlebitis.

The chief cause of ENDOPHLEBITIS is a thrombus such

as may occur in the later stages of phthisis, or as a sequela of the acute specific fevers.

Periphlebitis is set up by open wounds, amputation flaps, or direct wounds of veins. If there are bad hygienic surroundings, if overcrowding, if chronic kidney-disease, with the conditions mentioned existing, periphlebitis may result. The inflammation set up by a thrombus in endophlebitis leads to thickening of the outer sheaths of the veins, while the inner cells swell up and become numerous and active. Ultimately adhesion between the vein and the thrombus occurs, and this may terminate in the following ways :—

Liquefaction, the venous circulation being restored ; permanent adhesion, the outer coat and the thrombus becoming continuous ; the vein and the thrombus reduced to a state of fibrous tissue : or calcareous infiltration may ensue.

The inflammation set up from without—Periphlebitis —may be due to an open wound, ulcer, or abscess, the pus finding its way to the vein in sufficient quantity to cause a large abscess on its sheath. The result is, the nutrition of the vein is disturbed, with paralysis of the muscular fibres of the middle coat ; cloudy swelling of the inner wall, obstructing the flow of blood, leads to a thrombus.

The pus formed gradually finds its way to the surface, and escapes either by natural or artificial means.

Symptoms.—The symptoms of Endophlebitis are chiefly local. The vein becomes hard, swollen, and tender, the limb stiff, and darting pains shoot along the course of the vessel. If the inflammation attacks superficial veins its course can easily be detected by the eye ; if deep-seated, as when the chief venous trunk is involved, the whole limb becomes swollen, and phlegmasia dolens ensues. Should it be a smaller vessel, as the tibial instead of the common femoral, the part becomes hard and swollen, but without any great superficial œdema.

The constitutional symptoms in the cases alluded to

may be slight, but if pus forms a change occurs. Pain becomes throbbing, constitutional symptoms of a typhoid character appear, with weak pulse, foul tongue, diarrhœa, delirium, and, in the great majority of cases, death. In fact pyæmia, in all its fatal significance, supervenes on the suppuration of the veins.

Diagnosis. — Inflammation of the veins has to be diagnosed from inflammation of the lymphatics and erysipelas. In the former case the glands are enlarged from the commencement of the disease; the streaks are rosy red and numerous. In the latter there is a general blush.

Prognosis.—The prognosis is favourable except in the suppurative or pyæmic form, which generally ends fatally.

Treatment.—Absolute rest is essential in all the forms of phlebitis, and is obtained by fixing the whole limb by sand-bags or splints. Hot fomentations are pleasant, and allay pain. If pus is supposed to be forming, warm poultices must be applied, and an opening made where the abscess is apparent.

Medicines, as bark and ammonia and wine, are given to support the patient's strength. Calomel and opium are now abandoned.

2. Varix. In varicose veins the vessels are increased in length, diameter, and thickness.

The principal seats are the lower limbs; the body, when collateral circulation is set up by blocking of the venous trunks; the rectum (hæmorrhoids); the scrotum (varicocele).

Diagnosis.—The diagnosis is unmistakable.

Prognosis. — The prognosis is generally favourable unless complications result, and there is a tendency to rupture or inflammation. In both of these complications the result may be fatal.

Treatment.—The treatment belongs to surgery, but the indication is to find the cause of the varicosity, and if possible remove it. Support the limb by an elastic stocking or well-applied bandage. Operative interfer-

ences are attended with great risks from the danger of phlebitis or pyæmia being engendered.

3. Hypertrophy, atrophy, phleboliths, and new growths of veins do not require special mention. Parasites in veins are considered under Bilharzia Hæmatobia, p. 408.

4. Wounds of veins. After venesection gentle pressure is applied over the vein, and this leads to union in a few days, without, as a rule, any inflammation. No cicatrix results, and the vessel is not obstructed. Sometimes, but fortunately rarely, inflammation ensues, with suppuration and pyæmia.

5. Air in veins may cause death from arrest of the pulmonary circulation. This unfortunate result sometimes occurs in surgical operations.

Treatment. — The indications, according to surgical authorities, are to place a finger on the wounded vein, then (1) get the air out of the auricle; (2) to fill the auricle with blood; (3) to keep up a supply of blood to the brain. The first indication is fulfilled by keeping the finger on the vein during inspiration, and removing it during expiration; the second indication by applying friction to the limbs in an upward direction; while, for the third indication it has been recommended to compress the abdominal aorta and the subclavian arteries, in order to ensure the passage to the brain of what little blood may be leaving the left side of the heart.

DISEASES OF THE DIGESTIVE SYSTEM

In all diseases, as a matter of routine, the tongue is necessarily examined. Thus, it may be moist or dry, its size and colour may vary, and it may be abnormally clean or covered with epithelium or "coating." Valuable indications may thus be afforded as to the disease itself, the state of the system generally, and the progress towards recovery or the reverse. It is impossible, however, by its appearance to predicate what the disease may be, though

it is useful to remember that the tongue is pale in general anæmia; red as to its tip, edges, or papillæ, in subacute inflammatory stomach derangement. If covered with a thick fur, the stomach is probably affected in its mucous membrane, whereas, if it looks red, as in scarlet fever, the other parts of the gastro-intestinal tract are also involved.

The tongue may be the seat of local affections. Thus, simple ulcers, the result of gastric derangement, may form on its tip or frænum. Ulcers may be of syphilitic origin, and if so, are usually situated at the sides of the tongue and inside of the lips. Sometimes syphilis forms oval patches, without any ulceration.

Treatment.—If the local affection is the result of gastric derangement, attention to the diet and a mild purgative will generally effect a cure (F. 8); if of syphilitic origin, then the constitutional remedies for that disease must be put in force.

DISEASES OF PALATE AND FAUCES

Inflammation of the palate or fauces may occur under several forms. Thus there is a variety called "simple" or "catarrhal," commencing with bright red patches on the inside of the cheeks, and extending with considerable swelling until the whole surface may be covered. It is attended with a bad taste, furred tongue, and want of appetite. The mucous follicles, again, may be enlarged and obstructed, and when they soften and burst, as they usually do, small ulcers are left with some redness. This variety is termed "follicular." In infants, especially after some feverishness and restlessness, small yellowish-white spots on the lips, cheeks, or palate are seen. These are vesicles, which, bursting, leave small ulcerations. This form is called "aphthous." Two other varieties claim a few additional words.

Parasitic Stomatitis depends on the presence of a parasite, *Oidium albicans*. There are heat and pain in

the mouth, and the disease is revealed by whitish-gray patches, looking like curdled milk and easily detached. It is peculiar to young infants, being known by nurses and mothers as the "thrush." Sometimes it appears in the later stages of phthisis in adults, and is a specially unfavourable symptom.

GANGRENOUS STOMATITIS, or CANCRUM ORIS, is a rare but dangerous affection, attacking weakly children recovering from measles or other acute disease. The ulceration commences on the mucous membrane of the lip or cheek, and spreads to the deeper tissues, perforating the skin, destroying the jaw, and leaving a hideous excavation with ragged gangrenous edges. It is noteworthy that pain and tenderness may be slight or altogether absent.

Swelling of the cheek, intense fœtor of the breath, great salivation, and rapid prostration with a fatal termination, may accompany the local changes described.

Treatment.—In all affections of the mouth, chlorate of potassium seems beneficial, given in two-grain to five-grain doses to children, but increased to twenty or thirty in adults (F. 7). Borax and glycerine may be applied locally in thrush; and, in cancrum oris, the only chance for the child depends on its being put under chloroform, and having the part burnt with strong nitric acid. The strength must also be supported by brandy and beef-tea, and the mouth should be freely washed with Condy's fluid or carbolic acid lotion.

MUMPS, CYNANCHE PAROTIDEA, is an acute contagious affection of the parotid and other salivary glands, the parotid especially being much swollen and painful to the touch. It is attended with some fever, and difficulty of opening the mouth and swallowing. The contagion of mumps in some cases seems to be very prolonged. One case lately came under my observation, where seven weeks elapsed before the disease occurred in a second member of the family. The disease extends over a period of four or five days and terminates in recovery, its declen-

sion being occasionally marked by swelling of the testicles or mammæ.

CATARRHAL TONSILLITIS is characterised by soreness of the throat, with superficial inflammation of the tongue and tonsils. It depends on cold, and is sometimes termed "sore" or "relaxed throat." It rarely ends in suppuration, recovery being effected in three to four days.

QUINSY, — *Synonym*, Suppurative Tonsillitis, — is attended with fever, fœtid breath, and pain in one or both tonsils, shooting along the Eustachian tube into the ear.

The tonsil or tonsils are red and inflamed, the inflammation terminating in resolution or progressing to suppuration, with speedy recovery following the discharge of pus.

It is caused chiefly by exposure to cold, and is most common in youth.

A form of chronic tonsillitis is not uncommonly seen in young and delicate children, where the tonsils are enlarged and the voice husky, with occasional deafness.

Treatment.—In MUMPS a saline mixture and a flannel bandage over the glands are alone requisite (F. 66). In QUINSY the inhalation of steam and the application of hot linseed-meal poultices hasten resolution or promote suppuration. Sulphate of magnesium (F. 24) can be recommended. The bowels having been freely moved, tincture of aconite 1 minim dose along with tincture of belladonna 2 minims, may be given every hour. These remedies sometimes cut short the inflammation, and the suppurative stage is not reached. Guaiacum is also said to assist the action of aconite (F. 6). In CATARRHAL TONSILLITIS a mercurial purge should be given (F. 23), followed by local applications of tannin and glycerine, or glycerine and tinct. ferri perchloridi. In chronic tonsillitis excision of part of the gland is sometimes necessary.

DISEASES OF THE ŒSOPHAGUS

Acute inflammation may attack the œsophagus, constituting what is termed "acute œsophagitis," and may be due to extension of simple catarrhal inflammation of other parts; to direct injury from foreign bodies, or swallowing some corrosive poison; or it may be a complication of specific fevers, or cholera, or pyæmia. It is attended with pain, more or less severe, deep in the chest in the course of the œsophagus and with painful difficulty of swallowing and the vomiting of what has been taken, probably mixed with blood or membranous casts. There are also much thirst and great general distress.

The œsophagus may be the seat of stricture, either spasmodic or real, or of cancer.

These affections are all characterised by one prominent symptom—difficulty of swallowing, with, in cancer, great pain, enlargement of the lymphatic glands, cough, and husky voice, from the pressure on the trachea or recurrent laryngeal nerves. Non-cancerous stricture is generally the result of swallowing some corrosive poison.

In attempting a diagnosis when the symptoms point to the œsophagus it is important to look to the age and sex of the patient, to the presence or not of a cancerous cachexia, to the implication of other organs, and to the knowledge as to the seat of the stricture, if there is any, conveyed by an examination by the bougie. In forming a prognosis it is to be remembered that spasmodic affections of the œsophagus, though difficult to get rid of, are not fatal; whereas every form of obstruction is unfavourable, and in cancer a fatal termination may be foretold.

Treatment can only be palliative, unless in the spasmodic stricture of young and hysterical females, when the general treatment recommended in hysteria may be adopted. In spasm, friction with a belladonna liniment, the passage of a bougie, and careful dieting are essential.

INFLAMMATION OF THE STOMACH

Synonym, Gastritis.

Inflammation of the stomach may be either acute or chronic.

Acute inflammation again is subdivided into (1) catarrhal, (2) erythematous.

Acute catarrhal gastritis is most common in middle or advanced life, and in females more than males. Sometimes it is seen in gouty or rheumatic people, or it may appear in connection with diseases of the heart or lungs or cirrhosis of the liver. Errors of diet, as taking cheese or indigestible food, may arouse acute gastritis. The chief cause is, however, alcoholic indulgence.

Acute erythematous gastritis is met with generally in children or young persons, and is sometimes called "gastric" and "remittent" fever. It is seen in some of the eruptive fevers, as scarlet fever, and in the later stages of phthisis.

Pathology. —In catarrhal gastritis the stomach is found empty and contracted. The lining membrane is covered with thin mucus, which, when removed, reveals a congested surface with numerous small hæmorrhages or superficial ulcerations. The gastric tubes, on microscopic section, are seen to be distended with large granular cells, and the solitary glands are greatly enlarged.

In erythematous gastritis, as seen in scarlet fever, the morbid appearances differ from those produced by catarrh, in the amount of mucus not being increased, and in the tubes being distended by an albuminous fluid, instead of by large granular cells.

Symptoms.—In the catarrhal form there is usually great weakness for a few days or hours, and occasionally the attack occurs suddenly. There is not generally much pain. Vomiting is always present, and constitutes a characteristic sign. The vomited material at first consists of the remains of a meal, and afterwards a thin glairy fluid is expelled with much retching. There is no

appetite ; bowels are confined ; headache is severe. There is little increase of temperature, and the skin may be covered with perspiration.

In erythematous gastritis pain is the prominent symptom, unless the inflammation occurs with the eruptive fevers. The pain comes on after food, shoots down the shoulders, and is increased by pressure over the stomach, while vomiting is continuous, though a little mucus is all that is brought up. Thirst is troublesome. The tongue is at first red, afterwards dry and glazed. Diarrhœa of a fœtid and unhealthy character accompanies the disease. The temperature is increased.

Diagnosis.—The vomiting may be mistaken for that which occurs with brain disease. It is distinguished from it by this, that the vomiting of brain disease is easy, and unaccompanied by nausea.

From typhoid fever it is distinguished by the rapid onset of the gastric symptoms ; rapid, not gradual, rise of temperature ; and absence of eruption after the first week.

Treatment.—Rest to the stomach is essential. Hence no food should be taken for twenty-four hours. Ice may be sucked to allay thirst. If there is great exhaustion give nutrient enemata ; if excessive pain, injectio morphinæ hypodermica. If there is evidence of indulgence in stimulants and of portal congestion, 5 grains of calomel may be placed on the tongue, and after an interval of eight hours a draught of effervescing citrate of magnesium should be given.

Vomiting is best relieved, if excessive, by iced champagne taken occasionally.

Warm poultices are gratefully received by patients with acute gastritis, and seem to give relief.

When food is considered necessary it must be given in the liquid form, as chicken soup or milk mixed with Vichy or Seltzer water, in small quantities and frequently repeated.

Chronic gastritis is simply a form of dyspepsia. The group of symptoms included under dyspepsia, with treatment, is referred to at p. 302.

The stomach is also the seat of albuminoid disease, fibroid thickening, gangrene, softening, and diseases of the vessels, but these are rare conditions.

GASTRIC ULCER

Ulceration of the stomach is by no means an uncommon affection, and its existence was known to the ancient physicians, who laid down distinct rules for its treatment. In recent years zealous inquiries have been made as to the causation of the disease, the pathological anatomy of which is so peculiar.

Pathology.—It is a specific variety of ulcer. It is a distinct local lesion, and has only one analogue, viz. the corroding ulcer of the neck of the uterus. The *form* of the ulcer is that of a funnel. It seems punched out, and the edges may be bevelled off or thickened. The *shape* is usually circular. The size varies from that of a pin's head to one-third of the mucous membrane of the stomach. It may be of all degrees from partial removal of the mucous membrane to perforation, and it may be, as observed on post-mortem examination, either open or else partially or completely cicatrised—the relative frequency of the two conditions being about equal. Its site is markedly more frequent on the posterior than on the anterior wall of the stomach, its exact location being in four-fifths of the cases upon a surface bounded by the posterior wall, the lesser curvature, and the pyloric region. The rest of the surface of the stomach, while it is much larger, appears only to be affected in one-fifth of the cases. If situated on the anterior wall perforation more readily occurs, on account of there being no place for limiting adhesions, while if on the posterior, adhesions may take place to the pancreas, etc.; and thus, although the stomach is actually perforated, the adhesions prevent its contents passing into the peritoneum. It is worthy of note that by means of adhesions a communication may be set up between the stomach and colon, and thus fæcal matters

may be vomited with ease, not with difficulty, as in ordinary stercoraceous vomiting. The nearer the ulcer is to the coronary vessels, the greater the tendency to fatal hæmorrhage.

Etiology.—This ulcer, found only in the stomach or immediate neighbourhood, unattended by suppuration, and characterised by simple progressive molecular death, has suggested the explanation of its being caused by a corrosive action of the gastric juice, which could only occur under two conditions—(1) this gastric juice being either abnormally acid, or (2) the alkalinity of the wall of the stomach being abnormally diminished. These assumptions have been confirmed by the experiments of Pavy, who has found, if a certain quantity of acid is introduced into the stomach, and the circulation is left undisturbed, the stomach remains unaffected; but if with the same amount of acid the circulation is interrupted, the stomach becomes digested. If, moreover, the quantity of acid is greatly increased without interruption of the current of blood, digestion will likewise take place.

The derangement of the circulation, so essential to the production of the ulcer, may be due to a variety of causes, all of which, according to Virchow, "act by interrupting the circulation in circumscribed portions of the wall of the stomach." Among these causes may be mentioned thrombi or emboli in diseased gastric arteries, and chronic hyperæmia of the mucous membrane.

Symptoms.—Painful intolerance of food is the chief symptom. The pain which is felt at the epigastrium varies in intensity, and appears within a quarter of an hour after food is taken, being increased by emotion or by pressure over the umbilical or dorsal regions, according to the situation of the ulcer. Vomiting of food in all stages of digestion, with or without blood, is a pretty constant symptom. The quantity of blood varies greatly, but when present in *any* quantity it is a most important sign. Constipation almost invariably accompanies gastric ulcer, and the patient has a worn-out, low-spirited aspect.

given two or three times daily, mixed with the yolk of egg, and with the addition of 5 or 6 minims of ol. terebinth. This should be continued until there is no pain in the side, neither after eating nor exercise, and no yellowness about the eyes. As acidity and superabundance of the bile are probably causes of the return of the concretions, enjoin abstinence from substances which render the urine yellow and notably acid, *e.g.* salads, spirits, excess of animal food, spices or asparagus, while a moderate use of fruits, fowls boiled or roasted, and farinaceous food may be recommended.

"In other cases of jaundice," says Dr. Tanner, "as we shall be merely working in the dark, it will be better to rest contented with resorting to gentle saline purgatives, diaphoretics, baths, rest, and regulated diet."

DISEASES OF THE PANCREAS.

Clinically we know little of the disease of the pancreas, as the organ is rarely affected primarily. As it lies deeply in the epigastric region, behind the stomach and in front of the aorta, it must be remembered that if a tumour exists in connection with it, it will be discovered in this region, and that pain will be referred either to the front or to the back at the junction of the lumbar and dorsal vertebræ. The principal diseases to which the pancreas appears liable are "morbid growths" (chiefly scirrhus); "calculi" (phosphate of lime) of varying size, obstructing the chief duct, and leading to enlargement of the organ and the formation of cysts; and "catarrhal inflammation" of the same duct.

The symptoms of any of these affections during life are obscure, and attended with debility and malnutrition. As one of the principal functions of the pancreas is to assist the digestion of fatty compounds in the food, the presence of fat in the stools has been detected in diseases of this organ.

Treatment.—All special treatment of affections so difficult to diagnose during life seems out of the question.

DISEASES OF THE LYMPHATIC SYSTEM.

DISEASES OF THE SPLEEN.

The spleen, situated in the left hypochondrium, weighs about six ounces; its length is six inches, and its breadth rather more than three inches. Its external surface is convex; its internal border, which is concave, is in relation with the cardiac end of the stomach, and has a vertical fissure—the hilus—at which apertures are found for the entrance and exit of vessels and nerves. It has no excretory duct, and its exact purpose in the system is as yet undetermined.

Composed essentially of an elastic fibrous framework (trabecular tissue), of Malpighian corpuscles, and of spleen-pulp, it may become distended with blood from slight causes, especially from those which interfere with the action of the skin, the liver, or the kidneys. These causes continuing, its elastic power may be lost and it thus becomes unable to send the accumulated blood onward. It may thus suffer from congestion leading to inflammation, abscess, and gangrene. Emboli are apt to lodge in the spleen in the course of typhus fever or pyæmia, giving rise to what are termed "hæmorrhagic infarctions." These infarctions are observed at post-mortem examinations as wedge-shaped masses, with the base towards the surface of the organ. Sometimes their previous existence may be detected by a depressed cicatrix; but, in pyæmia they break down into a purulent fluid and give rise to general inflammation of the organ. The spleen also may, though rarely, be the seat of disease of a lardaceous character, which is common, or cancerous, which is rare; or serous and hydatid cysts may form within it. If portal obstruction exists, enlargement of the spleen is a necessary consequence. In addition to the forms of disease mentioned, Leucocythæmia and Hodgkin's disease are by some considered

these two extremes, if we neither eat too plainly nor too abundantly, we may yet try its staying powers by the rapidity with which we swallow our food, or the length of time we allow to elapse between meals.

An organ tried so much naturally rebels, gets out of gear, and sooner or later dyspepsia or indigestion supervenes, and the whole body sympathises with its ailments. The mind becomes clouded and the temper peevish, bodily vigour is impaired, and life is rendered not a pleasant holiday, but a sour and angry fact. Dyspepsia has many symptoms, and a brief consideration will be given to the most prominent of these, and how they may be met.

Want of Appetite may depend on mental causes, as joy, anger, or anxiety, or it may appear without any apparent cause. Common sense must dictate how to deal with the former causes, and, for the latter, an acid or a bitter infusion may be employed, or orexin hydrochloride 5 or 6 grains (F. 10), not in a pilular form, but given in water with meals.

Nausea and Vomiting.—Nausea after taking food, which may or may not terminate in vomiting, sometimes attracts attention—the vomited matter being sour at first, but, if the vomiting be long continued, mixed with bile. To soothe this irritability there are special therapeutic remedies, such as creasote and hydrocyanic acid (F. 9), in addition to careful regulation of the quantity and quality of food.

Flatulence and Belching.—Flatulence, popularly termed "the wind on the stomach," may be due to many causes, prominent among which is the fermentation of food or the want of an accustomed meal at a certain hour.

It is often relieved by warm carminatives (F. 13), and by a regulated interval between meals. If it immediately follows the taking of food, pepsine and rhubarb are useful (F. 91).

Should belching be accompanied by a rotten-egg flavour, showing the evolution of sulphuretted hydrogen gas, creasote and charcoal biscuits should be ordered; if

there is also great acidity, prescribe sp. ammon. aromat., liq. pot., and tinct. rhei (F. 73).

Pain.—Cullen describes two kinds, cardialgia or heartburn, and gastrodynia or cramp or spasm of the stomach. For simple heartburn black sugar or eating an apple are popular but good remedies; or we may give a draught of liquor of bismuth and spirit of chloroform, or F. 11. Gastrodynia Dr. Abercrombie thought was due to a loaded colon, and hence ordered a brisk purgative, followed by carminatives (F. 25, 13). A mustard poultice often gives relief.

Water Brash, Pyrosis, attended with the eructation of thin tasteless watery fluid, may be connected with organic disease of the stomach, or with the taking of some particular kind of food, as oatmeal. If we treat it simply as a symptom, pulv. kino co. can be recommended combined with a watery purgative in the morning, as Friedrichshall or Püllna.

In 1842 John Goodsir discovered in the vomited matters of certain patients small flat bodies having a rectangular outline and a somewhat oblong shape, and resembling little packets tied lengthwise and across with a string; hence he called them sarcinæ (bundles). They are the cells of a fungus, and are evidence that the stomach is prevented by disease from completely emptying itself. Sulphite of sodium given in 10 to 20 grain doses gives relief, by the sulphurous acid being set free in the stomach; washing out the stomach is also beneficial.

Dyspeptics constantly ask, What shall we eat, and what shall we drink? and, although no fixed rules can be laid down, the following points are of practical importance.

Mutton is probably the most digestible of all animal foods, while all cured meats—ham, tongue, and sausage—are indigestible. Animal food is more easily digested than vegetable. While man's organs of digestion ally him more to the carnivorous than the graminivorous race, yet a mixture of animal and vegetable food suits the stomach best. Do not press prohibitions as to food too far, else you will convert the dyspeptic into a confirmed hypochondriac.

As a rule, there should not be more than three meals a day. The principal meal, dinner, should be separated from the others by an equal number of hours, and at it freshly roasted mutton, poultry, beef, or game should be eaten. Salted meats, pork, or veal are not suitable for a weak digestion. Of vegetables, spinach, French beans, young peas, and vegetable marrow may be taken in moderation, or if vegetables disagree, then rice well boiled and dry should supply their place. Bread should be taken stale or toasted. Light farinaceous puddings agree well, but pastry in any form should be avoided. The patient should never eat so as fully to satisfy the cravings of nature, but should rise from the table with an appetite. Wines, with the exception of champagne, do not promote digestion, and should not be ordered to a dyspeptic patient; the usual practice with regard to stimulants is to limit their use to a tablespoonful of brandy or whisky in half a tumbler of Seltzer or Apollinaris water. While these general rules are thus laid down, it is to be remembered that the idiosyncrasies of each individual case must be duly considered in regulating the dietary of the dyspeptic.

DILATATION OF THE STOMACH

An acute and a chronic form of dilatation of the stomach are recognised.

The former, acute, is very rare, only a few cases having been reported, and these only during the last few years.

Dr. Fagge states that the diagnostic points of this affection are:—

1. A rapidly increasing, unsymmetrical distension of the abdomen—the left hypochondrium being full while the right is comparatively flattened.
2. The existence of a surface marking descending obliquely towards the umbilicus from the left hypochondrium, and corresponding with the

dragged-down lesser curvature of the stomach, this line appearing to descend with inspiration.

3. The presence of fluctuation in the lower part of the abdomen.
4. The occurrence of splashing when the lower part of the abdomen is manipulated.
5. The presence of a uniformly tympanitic note over a large part of the distended region when the patient lies flat on his back.

Treatment.—Empty the distended stomach with the stomach pump, and sustain life by nutrient enemata.

Chronic Dilatation.—This condition is caused by the digested food being prevented from entering into the duodenum. As a rule, there is (1*st*) stricture of the pyloric orifice the result of cancer, either as a hard scirrhous ring or projection of a fungoid growth: (2*d*) there may be stricture, non-malignant, due to fibroid thickening; or, in some rare cases, thickening of the mucous membrane alone may cause contraction: (3*d*) the cicatrisation of a simple ulcer near the pylorus may cause obstruction: (4*th*) tumours, generally malignant, may press on the opening: (5*th*) the stomach may be displaced by adhesions, and the pyloric orifice dragged downwards, till dilatation of the organ results: (6*th*) the stomach may be dilated by paralysis of the muscular coat due to injury of the splanchnic nerves; or a certain amount of dilatation may follow on chronic gastritis.

Anatomical Characters.—When the abdomen is opened in a case of death from dilatation of the stomach, the organ is found to be greatly enlarged, and seems to fill the whole cavity. The greater curvature lies below the pubes. The position of the pylorus varies according to the disease affecting it. It may either be tied down by adhesions to its original site, or dragged from its natural position by the weight of the organ. When laid open the stomach seems filled with dark-coloured frothy fluid. The rugæ are effaced by constant stretching, and the mucous membrane is more or less softened by the *post-*

mortem changes effected by the acid contents. Microscopically the tubes may be found widely separated or altogether destroyed; the gastric cells may be large and fatty; or the muscular structure may be, notably at the pylorus, in a state of hypertrophy.

Symptoms.—The symptoms are gradual. There is usually a history of long digestive derangement, acid eructation, and vomiting. This latter symptom is very constant, but the vomiting does not occur, as in gastric ulcer, soon after taking food, but at long intervals, most frequently at night or towards the morning; occasionally it is attended with hæmatemesis. The character of the vomited matters, which are brought up easily and without strain, is peculiar, of a dark-brown colour, and very acid. On standing they become covered with a scum, and a thick brown sediment settles. This sediment shows, by a microscopic examination, sarcinæ and torulæ, intermixed with food and mucus. The bowels are always constipated, the urine thick and depositing lithates. The nutrition of the patient suffers, and death takes place from exhaustion, preceded by swelling of the legs and feet.

Physical Signs.—A large extent of tympanitic sound; irregular distension of the abdomen; fulness of the left side of the abdomen and vermicular motion apparent over the organ; the character of the vomiting and the detection of sarcinæ under the microscope. The history of the case and the age of the patient must guide the practitioner as to the cause of the dilatation.

Treatment.—The main point is to restrict food, and to have a diet free from sugar and starch—thus gluten bread with lime water and weak coffee with no milk or sugar for breakfast; soup for dinner, fish, mutton, or chicken with no vegetables. Cod-liver oil may be given; nutrient enemata and washing out the stomach with Vichy or Carlsbad water are sometimes serviceable. To relieve constipation we may give enemata of gruel and warm water, and aid their action, if necessary, by castor oil or turpentine. The pain, if present, is abated by the subcutaneous injection of morphina, or a mixture of hydrate

of chloral and bromide of potassium. Acidity is corrected by bismuth, soda, and magnesia; or Mistura Creasoti; or carbolic acid in 2-grain doses; or, according to Sir William Jenner, by hyposulphite of sodium.

CANCER OF STOMACH

Cancer has a partiality for the orifices of the stomach, being most common at the pylorus. When in that situation, it is usually colloid or villous, or of the scirrhous type, and may be associated with cancer elsewhere — especially of the liver. When at the cardiac orifice, the cancer is always of the epithelial type, and frequently extends up the œsophagus. The body of the stomach is very rarely affected without the orifices. Under the age of thirty cancer of the stomach is rare. The average of 600 cases was, according to Brinton, fifty years. Sex appears to have no influence in its production.

Symptoms.—Vomiting and pain are pretty constant symptoms. When the pylorus is involved, pain comes on some time after taking food, the vomited matter is frothy and fermented, and contains sarcinæ. If the cardiac orifice be the seat, the pain comes on immediately after taking food, and is very lancinating or gnawing. In either case the vomited matter may contain cancer elements and blood altered by the secretions—"coffee-ground vomit."

Loss of appetite, great emaciation, with the general cancerous cachexia, are prominent symptoms, the latter being well marked. The physical examination is most important. A hard, uneven, immovable tumour is felt an inch or two below the liver to the right side, although it may be dragged to the left. When the pylorus is affected, the stomach is large and distended. The percussion is tympanitic, and Hippocratic succussion may be developed from the presence of fluid food and air. By grasping the stomach, we limit the motion of the fluid; and thus the size of the stomach may be seen, as well as

an exaggerated peristaltic motion giving sometimes an hour-glass appearance, and beginning at the left hypochondrium.

Owing to the bowels being to a great extent empty, undue prominence of the epigastrium is a not uncommon sign.

The duration is important, as it never exceeds two years.

Diagnosis.—The following points are of practical importance in distinguishing cancer of the stomach from simple gastric ulcer. The cachexia, the constant pain, the occurrence at middle life, and, more important than anything else, the detection of the tumour by physical signs, are characteristic of cancer; while a youthful age, the female sex, copious hæmatemesis, non-detection of cancerous elements in the vomited matter, and a paroxysmal localised pain are peculiar to gastric ulcer. Further, chronic dyspepsia or chronic gastric catarrh differs from both in its history, its longer continuance, the absence of hæmatemesis and of great emaciation, and the fact of the pain being neither persistent nor circumscribed.

Treatment can be only palliative and supporting. Food should be given in small quantities, and—if it is pyloric obstruction—of such a kind as not to add to the discomfort by its tendency to ferment. Hence animal food is appropriate. Stimulants will often be required, and of these the effervescing ones, as champagne, are best. Laxatives are necessary. In some cases complete emptying of the organ by the "stomach-pump," and then regulating the diet, does good, or, as a last resource, feeding by the rectum. The vomiting may be controlled by morphina or ice, and the former will be frequently required for relief of pain (F. 71). Condurango bark has been greatly advocated of late (F. 8*a*).

OBSTRUCTION OF THE BOWELS

When called in to a case of obstruction of the bowels it is incumbent on the part of the practitioner to investigate the cause or causes on which this depends. It is necessary first to make certain whether or not it is due to hernia, and if such should be the case to act upon the precepts laid down in surgery. But if hernia is not detected he has to consider whether it belongs to *acute* or *chronic* obstruction. These two affections have *three* symptoms common to both—viz. constipation, pain, and vomiting.

Constipation may be said to be at the root of all obstruction, and so long as the cause of this is not removed, remains unrelieved by enemata or purgatives.

Pain exists fixed and constant over the seat of the obstruction, or more or less spread over the abdomen, or paroxysmal in character and not limited to any spot.

Vomiting occurs sooner or later in all forms of obstruction. *Soon* if the obstruction is situated in the upper part of the small intestine, and if the condition is unrelieved death will occur in the course of four or five days; *late* if the obstruction is in the large intestine, and even, if unrelieved, the end may be delayed for weeks. The vomited matters consist, first, of the contents of the stomach, and these are followed by bile-coloured fluid from the duodenum; finally of matters, down to the seat of obstruction, the smell of which is intense and fæcal. While the symptoms mentioned are common to both forms, yet there is a marked difference in the rapidity with which they are developed; for in chronic obstruction the constipation may not be complete as occasional fæcal evacuations are passed from time to time. The vomiting is also delayed, in some cases for weeks, after the stoppage has occurred, and the pain may be absent or only paroxysmal.

Etiology of Chronic Obstruction.—Chronic obstruction may be due to the impaction of fæces in the large intes-

tine, or to two diseased states—contraction or stricture. Contraction occurs chiefly in the small, and stricture in the large intestine. The latter condition (stricture) may be either simple or cancerous. Digital examination of the rectum in such cases sometimes gives important information, and when the finger is unable to reach the supposed seat of the obstruction, the attempt may be made to insert the whole hand when the patient is under the influence of chloroform.

Etiology of Acute Obstruction.—The causes of acute obstruction fall under four principal heads: I. Constriction or internal strangulation affecting chiefly the small intestine; II. Volvulus or twists situated generally at the cæcum or sigmoid flexure; III. Impaction of a large gallstone in the small intestine; IV. Intussusception of the small intestine.

Symptoms.—In all these forms constipation is absolute, and vomiting is an early symptom, and with these symptoms there is collapse, a condition marked by sunken face, by dark circles round the eyes, by a pulse rapid and small, by cold sweat on the limbs, and by a high-pitched or hoarse voice. Intussusception has peculiar features, and its nature is similar to what occurs when the finger of a glove is pulled within itself. The most common invagination is ileo-cæcal,—that is, the passage of the ileum and cæcum into the colon preceded by the ileo-cæcal opening. It occurs most frequently in children, and as there is greater mobility of the colon at that age than in adult life, the invagination often in a few days makes its way through the whole colon, and appears in the rectum above the anus, through which it is even at times prolapsed. The first symptom is violent colic followed by vomiting. Next comes, through increased peristaltic action, acute diarrhœa with bloody stools. Painful tenesmus and paralysis of the sphincter of the rectum are observed later. The course of such invaginations in children is rapid, and leads to complete occlusion, death resulting in three to six days, or in a few hours from shock. In other cases, and especially in adults,

separation and gangrene of the intussuscepted portions may take place gradually, and death may not occur until the second or third week; or the course may be chronic, the swelling may disappear, and, the canal of the intussuscepted portion becoming permeable, the fatal termination may be delayed, with alternate diarrhœa and constipation for a year. A more fortunate result is when, spontaneously or by suitable treatment, the invaginated portion is withdrawn into its normal position without separation, or sloughs off and is expelled.

Treatment.—In cases of intussusception of children, when the prolapsus is perceived at the rectum, it is necessary to anæsthetise the patient and attempt reduction. This is done by the hand or sponge sound, and after this reduction has been effected so far as it can be, viz. into the lowest part of the sigmoid flexure, it is followed by injections of air and water. All attempts at reduction are forbidden if there are signs of gangrene, and if the invagination is fixed and chronic. In the other forms of acute obstruction the question of treatment lies between a surgical operation and the giving of opium. The decision come to is very grave, and involves great responsibility. If a surgical operation is decided upon it should be done early, before the pain and the suffering become intense, and before collapse sets in, and, if determined upon, opium should not be given, because its action conceals the nature and progress of the case. If a surgical operation is negatived, then opium must be given freely; in the case of an adult, to the extent of one grain at least every three hours, or every two, according to circumstances, and according as its action is manifested. This remedy here does more than soothe pain: it arrests violent and useless peristaltic action; it favours the accumulation of liquid contents above the obstruction; and by the combination of these factors relief may be secured, and the obstruction pass away.

Previous to giving opium and before there is any probability of gangrene having set in, a simple mode of

procedure may be adopted, whereby obstruction in some cases is removed. The patient is placed on his back, with his pelvis raised, and a long stomach-pump tube inserted into the rectum as far as it will go without force. Then warm water should be slowly thrown up until the bowels become distended. When this occurs the coils of the intestine should be moved upon one another by the hand placed on the abdomen. By this method, or with air instead of water, cases have been successfully treated; and besides, from a diagnostic point of view, it is valuable, as an idea may be formed from the amount of water capable of being thrown up where the obstruction exists.

In some cases it is necessary to nourish the patient by stimulating enemata.

In the treatment of CHRONIC OBSTRUCTION a strongly-acting purgative may be wisely ordered (F. 25), or an enema may be employed, as aloes, and these means may altogether remove the obstruction if due to fæcal impactions. If dependent on cancerous stricture the time comes when no aperient remedy can afford relief, and then opium, to check peristaltic action, should be given every four hours. Belladonna aids its action, as in the form of a pill of ext. opii gr. i. and ext. belladonnæ gr. $\frac{1}{4}$.

Diet.—In acute obstruction the diet is similar to that recommended in Peritonitis, p. 315.

PERITONITIS

The peritoneum, or serous membrane lining the abdominal and pelvic cavities and investing the viscera, may suffer from acute or chronic inflammation. The *pathological* changes are precisely similar to those which occur in all serous membranes, viz. capillary congestion, redness, more or less loss of polish, and exudation resulting in a thin grayish lamina, which ultimately becomes thicker and either ribbed or villous according to position. The

surfaces of the intestines are injected, and they are slightly glued together with soft yellow-gray lymph stretching from one fold of the peritoneum to another. In the pelvic cavity there is turbid fluid, in which float flakes of lymph. The effused fluid is chiefly observed in chronic cases, and tends naturally to gravitate to the lower and more dependent parts, *e.g.* into the pelvis and lumbar regions, where it may escape observation; or, if excessive, it may distend the abdominal walls. This fluid may be clear or bloody, or become rapidly or slowly purulent.

Peritonitis, even though of local origin, tends to spread until the whole of the peritoneal surface is involved; and convalescence, should it occur, is attended with absorption of the fluid, organisation of the false membrane, thickening of the peritoneal surface, and adhesions of adjacent organs. Should the fluid be purulent, it may form an external abscess or escape into the intestines.

Etiology.—Acute peritonitis is of much more frequent occurrence in the female than in the male, and this is explained by the fact that with several of the functions of females, as menstruation, pregnancy, and parturition, the peritoneum is very intimately connected. Pure idiopathic peritonitis is comparatively rare, yet it may occur, as analogous diseases, like pleurisy or pericarditis, attack membranes having a structure like the peritoneum. It may follow on some chronic diseases, as Bright's disease or scurvy. It is also seen as the result of processes of ulceration, with or without perforation, in the stomach and intestines, from hepatic abscess, or from inflammation of the kidneys and urinary passages.

Symptoms.—Peritonitis, apart from any direct local cause, sets in suddenly, with acute pain distributed over the whole abdomen or confined to a circumscribed spot. This pain is increased by the slightest pressure, and patients to ease it assume a characteristic position, lying on their back with their legs drawn up and their knees bent. The aspect of the countenance is altered, with symptoms of collapse clearly depicted on it. Vomiting

and hiccup are seldom absent, with tormenting thirst and coated tongue. As a rule, the bowels are constipated and the urine is scanty, and in some cases there is complete retention. The abdomen becomes more or less completely distended. The pulse is rapid—120 per minute—to the feel hard and wiry, and the temperature is raised—to 104° or 105° F. More or less effusion is developed in the course of the disease. Consciousness in the majority of cases remains intact. In fatal cases the symptoms of collapse increase, respiration becomes incomplete, and in a few days from the commencement of the attack death occurs. Recovery takes place most frequently in cases of plastic fibrinous effusion, and the symptoms which in any case indicate a change for the better are a uniform lowering of temperature, decrease of pain, cessation of vomiting, presence of fæcal evacuations, and return of sleep. In *peritonitis* from *perforation* the pain is intense, and accompanied with a feeling as if something in the abdomen had burst or given way; air enters into the peritoneal cavity, and tympanites results with attendant symptoms of collapse, fall of temperature, and death within a few hours, or at the most a couple of days. In *puerperal peritonitis* we have, in addition to the intense weakness and collapse previously mentioned, a septic infection of the blood, and the general condition known as septicæmia.

Treatment.—Absolute rest is essential in treating a case of acute peritonitis, and this rest may be obtained by maintaining the position which the patient instinctively assumes, and at the same time guarding the body, by means of a cradle, from unnecessary weight of the bedclothes. Still further, complete rest must be given to the bowels by opium, which checks peristaltic action, and reduces the dilatation of vessels associated with acute inflammation. Begin with one grain of opium, and note its effect in an hour, when a dose should be repeated. At the end of the second hour the quantity should be *doubled*, unless symptoms of the action of opium are observed, when it may be given in the same dose, and so

on, at intervals of two hours, until slight narcosis is manifested. The system should be kept under the influence of opium for ten days or a fortnight, and at the expiry of that time the action of the bowels should be solicited by an enema or castor oil. Other symptoms must be met as they occur—tympanites by a turpentine enema; hiccup by ether, ice, or a hypodermic injection of morphine.

If the peritonitis is circumscribed and seen early, leeches should be applied to the site noted, and the bleeding encouraged for a time by hot fomentations.

In puerperal peritonitis, collapse and cardiac failure necessitate the administration of stimulants, as champagne, in large doses; or ether may be injected subcutaneously.

Local Applications.—Warm fomentations should be used constantly, and changed when cool, and when there is much distension of the abdomen, flannel wrung out of hot water and sprinkled with turpentine gives great relief. When the tympanitic distension is very great it may be advisable to puncture the intestine with a fine trocar.

Diet.—Ice-cold milk and an occasional teaspoonful of beef-tea jelly are the best nutriments in idiopathic peritonitis. If the case is one of peritonitis from perforation, as in ulcer of the stomach, the strength should be supported by zyminised suppositories (meat), and an occasional teaspoonful of toast-water by the mouth. Not until the fourth or fifth day should a dessert-spoonful of beef-tea jelly be allowed, and about the ninth day some strong chicken soup. Little bits of ice may be permitted if the patient is cautioned to suck them very slowly.

CHRONIC PERITONITIS

Three varieties of chronic peritonitis are recognised—1. Simple. 2. Tubercular. 3. Cancerous. (1) Simple chronic peritonitis is not a rare disease. It is equally

frequent in both sexes at ages varying from twenty to sixty years.

Pathology.—In well-marked cases a post-mortem examination reveals the following conditions. The peritoneal membrane is thickened, adhesions exist between different parts, the omentum is drawn up and binds the colon to the stomach. Sometimes newly-formed membranes may cause adhesions among themselves, which divide the intestines into a number of separate chambers, each containing fluid. As a rule, however, there are no adhesions, no separate chambers, but a remarkably shortened omentum.

Clinical History.—Ascites is the chief symptom. The fluid effused into the peritoneal cavity is transparent and straw-coloured, and its commencement is insidious and obscure unless, which rarely happens, chronic peritonitis follows on the acute form. In such cases a sequence of symptoms can be traced in dull persistent pains, without, in uncomplicated instances, any great accumulation of fluid. The adhesions mentioned, when existing, prevent the fluid in the peritoneum gravitating freely. It is to be noted that sometimes a friction sound can be heard by the ear or felt by the hand, which results from the respiratory movements of the abdominal walls. No ostensible cause, except acute peritonitis, seems to originate the simple chronic form, but alcoholic excesses are alleged to favour its occurrence.

Tubercular Peritonitis—*Pathology.*—The peritoneum is here covered with minute grains, most numerous upon the under surface of the diaphragm and flanks. The omentum, containing a large quantity of tubercles cheesy or gray, lies as a flattened mass, sometimes two or three inches thick, below the stomach and over the colon. The intestines also show tubercular ulcers, and the pleuræ and the pericardium contain a considerable quantity of fluid.

Clinical History.—Tubercular peritonitis occurs in males more often than females at ages varying from ten

to fifty years, with vague and obscure symptoms of want of health, loss of flesh, and diarrhœa, before any effusion is observed in the peritoneum. When it attacks children, between the ages of two and ten, the tuberculosis involves not merely the peritoneum, but simultaneously also the intestines, the liver, and the mesenteric glands, and may subsequently spread to the lungs, pleuræ, and meninges. In seven cases out of nine it does not go beyond the abdomen. In fully-developed cases the symptoms are characteristic. The body is thin and wasted, the appetite capricious, the bowels relaxed, the motions sour-smelling; THE ABDOMEN IS TENSE AND SWOLLEN, WITH VEINS MARKEDLY VISIBLE. The accompanying fever is of an intermittent character.

Prognosis.—If the tubercular peritonitis is *primary* the exudation may be absorbed, and recovery take place; but in most cases extension occurs, and tubercular peritonitis proves fatal in a few months.

Treatment.—In *simple chronic peritonitis* of adults or children recovery may occasionally ensue, if there are no lesions of other parts. To aid this a flannel bandage smeared with mercurial ointment should be applied round the abdomen, to promote absorption, and syrup of the iodide of iron given internally with good nourishing food. In the *tubercular* form, we must trust to the remedies employed in other tubercular affections, as the syrup of the hypophosphites, cod-liver oil, with the accessories of strengthening diet and suitable hygiene and climate. The use of the iodide of potassium has also been favourably reported upon.

CANCEROUS PERITONITIS—*Pathology.*—On the surface of the peritoneum are observed a large number of round or flattened granules, sometimes aggregated, sometimes single. From these, small processes are sent out, which, contracting, drag neighbouring parts of the serous membranes towards them. Thus the omentum is drawn up and lies across the abdomen, below the stomach, as a firm, solid mass. Cancerous peritonitis is rarely primary, but

is secondary to malignant disease of other viscera, notably of the stomach of either sex or of the uterus in females. Below the age of thirty this disease is rare. It occurs more frequently in women than men, between fifty and sixty.

Clinical History.—In the majority of cases there is ascites, and the indurated omentum can be detected by palpation; occasionally there is a hard mass of the skin and other tissues round the umbilicus, and in a few cases there is *no ascites*, but only a visible increase of the size of the abdomen. In such cases the carcinomatous growth has undergone colloid degeneration.

Treatment.—This can only be palliative, relieving pain by narcotics and providing for easy digestion by suitable diet and aperients.

Typhlitis and Perityphlitis.—In the right iliac fossa lie the cæcum and its appendix, only anteriorly and laterally covered by peritoneum. Inflammation not unfrequently attacks this particular part of the intestine, and if the inflammation affects the mucous surface and the coats of the cæcum, it is termed typhlitis (τυφλός, blind; terminal *itis*); while, if the areolar tissue connecting the cæcum to the psoas and iliacus muscles is also involved, the term perityphlitis is employed.

Various causes may originate the inflammation. Thus concretions (fæcal or phosphatic) may accumulate in the vermiform appendix, or bits of bone, pins, bristles, etc., may stick there, or any of the intestinal ulcers may perforate the bowel at the place mentioned. Should the perforation occur where the bowel is free from peritoneal covering, fæcal matter escaping directly into the surrounding tissues leads to inflammation and abscess, which may take a varied course. Thus it may open into the rectum, or form a swelling in the groin, or pass downwards along the psoas and iliacus muscles to point at the upper part of the thigh. In the majority of cases, however, it presents itself in the iliac region in the position which the cæcum usually occupies, whence it may be discharged

either by one of the ways previously alluded to, or it may again enter the cæcum by its original orifice, or a series of sinuses may be formed, which never entirely close.

Should perforation take place directly into the peritoneal cavity, fatal peritonitis will of course result.

Symptoms and Progress.—The early symptoms are pain and tenderness in the iliac region, rigors and fever. The patient lies on the right side with legs drawn up. If an abscess forms and extends downwards, the symptoms are obscure; if it tends to point anteriorly, the fulness and hardness become more pronounced, and the contents may be discharged into the bowel, or externally by an artificial anus. Should the discharge be into the peritoneum, the local symptoms of pain and tenderness will not be confined to one particular spot, but be general over the abdomen, occasioning great suffering and death in a few hours.

The duration of typhlitis is uncertain, sometimes ending in speedy recovery, or in death from a lingering and obscure illness.

Treatment.—Perfect rest, and diet confined to slops, are essential points in treating a patient suffering from typhlitis. Opium should also be freely administered, as mentioned in the treatment of Peritonitis, p. 314. At the commencement of the attack no aperient medicine should be given, and when the attack subsides the greatest care with regard to diet and medicine should still be enforced. The sloppy food should be continued for some days, and the action of the bowels sought by enemata. There is, during convalescence, as much danger of a relapse occurring in typhlitis from inattention to these directions as there is at the same period in typhoid fever.

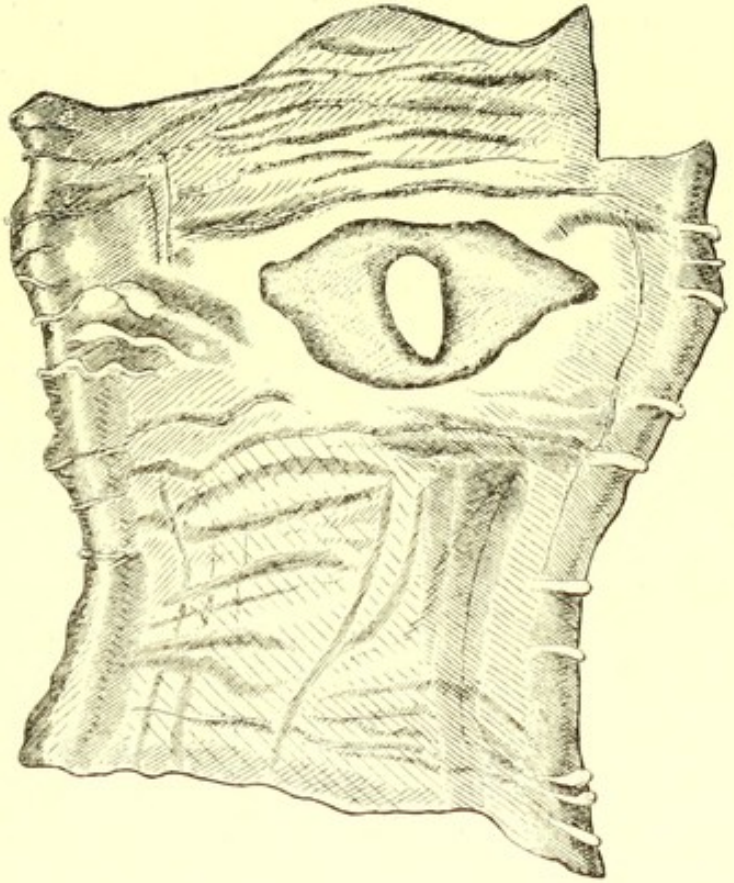
TUBERCULOSIS OF THE INTESTINES.—Tuberculosis of the intestines is in most cases developed in the course of phthisis, and probably depends on the tubercular sputum being swallowed. It may, however, be PRIMARY and the source of further extension of tuberculosis over the body,

and occurring in children it constitutes a characteristic type of disease, known as TABES MESENTERICA, and is generally associated with chronic tubercular peritonitis, the symptoms and treatment of which are alluded to under this affection, p. 317.

Pathology.—Tubercular ulcers are situated both in the large and small intestines, but their chief sites are on the small intestine in the vicinity of the ileo-cæcal valve. The tubercular new growth forms beneath the epithelium; diffuse infiltration and girdle-like ulcers result. Their position is transverse as regards the bowel, the margins and floor are thickened; sometimes imperfect cicatrisation is observed, the edges being drawn together and leading to contraction of the gut or even stricture. In contradistinction to tubercular ulcers we may here state that an intestinal ulcer, NON-SPECIFIC IN CHARACTER, may be the result of inflammation from various causes, as foreign bodies, calculi, hardened fæces, etc. The distinguishing characteristics of the simple and the tubercular ulcer are seen in the engravings.

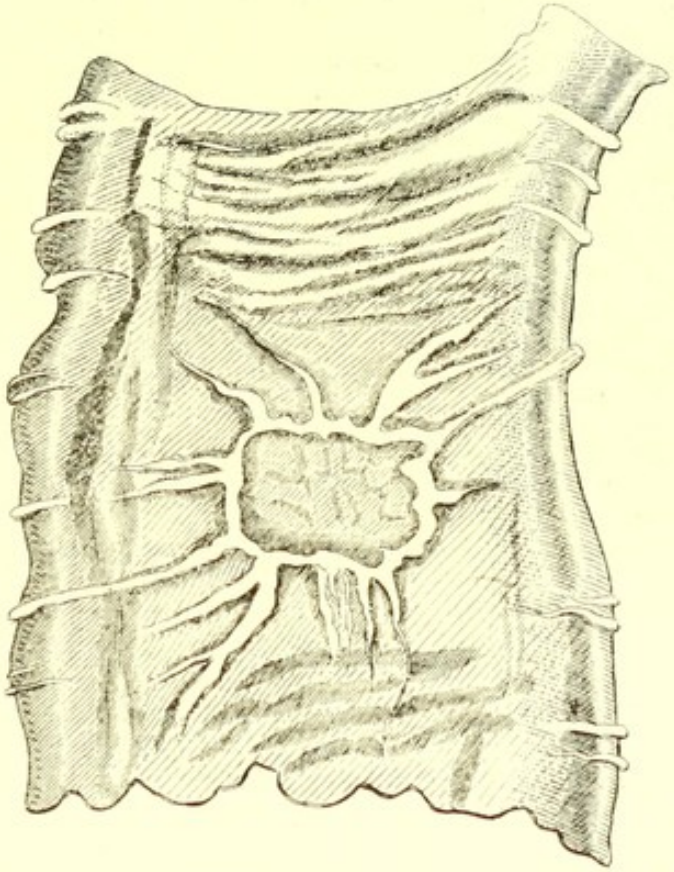
INTESTINAL WORMS

Of the different intestinal worms which inhabit the human body there are two great varieties—the hollow worms and the solid worms. In the first class we find three species of tænia, the most common being the *Tænia solium*. Its length varies from two to ten yards or more, and its habitat is the small intestine. It consists essentially of a head and segments. The head is about as large as a small pin's head flattened, with a double circle of hooks, around which are four suckers or mouths by which it attaches itself to the intestine. The segments, joints, or *proglottides*, are rectangular, and possess male and female organs opening into a common aperture retaining the ova, which, when ripe, contain a six-hooked embryo. The joints are at first more broad than long, but as they diminish in distance from the head they



SIMPLE ULCER OF INTESTINE

LIMITED IN AREA PUNCHED OUT APPEARANCE
TERMINATING IN PERFORATION – PERITONITIS.



TUBERCULAR ULCER OF ILEUM.

WALLS COMPOSED OF RUGÆ GATHERED INTO A HARD
CIRCULAR KNOT. CENTRAL AREA ERODED FORMING FLOOR.

become smaller and smaller, and the length exceeds the breadth. The *Cysticercus cellulosæ*, a parasite chiefly resident in pigs, seems to be the parent of the *Tænia solium* in man, and from uncooked or improperly cooked pork the tapeworm is developed in the human body. How does the tapeworm develop in the human body? The answer to this inquiry and explanation of the statement preceding it are as follows:—Segments containing abundant ripe ova are passed per anum and scattered about in various ways, and so are swallowed by animals, notably pigs, oxen, and sheep, mixed with their food. In the alimentary canal of these animals the shell bursts, the embryo escapes, attaches itself to the mucous surface, works its way into the tissues, and when it reaches a suitable spot, still further develops and presents a head and neck with a vesicular or bladder-like appendage. In this stage the worm is termed cysticercus or bladder-worm, and may be seen in the muscles, liver, and brain of various animals. If the cysticercus thus existing in the flesh of animals is permitted to enter the alimentary canal of a human being, it becomes attached by its head, the vesicle falls off, and a succession of segments form, constituting the ordinary tapeworm.

Symptoms.—The only phenomenon which seems to indicate the presence of the parasite is the appearance of segments in the fæces. Sometimes the victims of tænia also complain of pain in the belly, unsatisfied appetite, thirst, great depression of spirits, and itching of the anus or nose.

Varieties.—*Tænia mediocanellata* resembles very much the former variety, but it has only a sucking apparatus in the head, and no hooks. It appears to result from the further development of a *cysticercus* infecting cattle, and owes its introduction into the system to the eating of improperly cooked beef.

The *Bothriocephalus latus*, peculiar to Switzerland, Russia, and Poland, is the largest of all the tapeworms, sometimes attaining a length of twenty-five feet and upwards, each foot containing a hundred and fifty seg-

ments or joints, and each joint having its own male and female organs. The head is club-shaped with a longitudinal slit, by which it attaches itself, but it possesses no suckers.

Treatment.—When the presence of the worm has been discovered, the best way to expel it is to tell the patient to take no food for eight hours, then to administer in the evening xxx m. or more of the ext. of male fern in a draught of peppermint water. Follow this up in the morning with a dose of castor oil, and about mid-day by a large plate of mashed potatoes. The head and segments will probably be thus forced away; if not, let the same treatment be adopted on a subsequent occasion (F. 29). The tannate of pelletierine is also an effective anthelmintic, and may be given in doses of gr. vi.-viii. to an adult.

The bark of the pomegranate root, or kousso, or oil of turpentine, are all well-known anthelmintics, but are inferior to the male fern.

Round Worms possess a distinct integument and an alimentary canal, with a mouth at one end and an anus at the other. The sexes are always separate. The genital pore is usually near to the anus, and in the female is about the middle of the belly.

1*st*, *Ascaris lumbricoides*, the common round worm, resembles much the common earth-worm. The female is nearly twice as large as the male. Its habitat is the small intestine, generally of badly-fed children, but from this it may creep upwards to the colon or to the stomach, and it has also been found in the nose, and in the hepatic or pancreatic ducts. Authentic records indicate that a large number of *lumbricoides* may be in the body at the same time. As a rule, however, they rarely exceed five or six. They may penetrate the intestinal wall to the peritoneum, causing an abscess near the umbilicus. The symptoms are obscure and various. Generally speaking, these are thirst, disturbed sleep, fever, depraved appetite, and itching of the nose and anus.

Treatment.—The best remedy is santonin given in doses of one to three grains twice daily to a child, or double that quantity to an adult. Turpentine may also be given, or kamala and kousso, or the powder of male fern with other purgatives (F. 30).

2*d*, The common thread-worm (*Oxyuris vermicularis*) is small, white, and threadlike, the female being about a third of an inch long, the male about half that length. They exist in the colon or rectum, generally in great numbers at a time, and infest children who are badly fed or are in indifferent health. The chief symptom is itching at the anus or at the nose, with bad breath and generally indifferent health. The diagnosis can easily be confirmed by observing them in the fæces.

Treatment.—Enemata of cold water, infusion of quassia, tea, or liq. calcis, repeated daily, are sufficient to kill the oxyurides, with occasional doses of hydrarg. c. cretâ. For adults, perchloride of iron, half an ounce to a pint of water, is recommended as an enema. Dr. Cobbold prefers moderate doses of aloes and asafœtida followed by mineral waters, as Püllna, Friedrichshall, and Hunyadi Janos, to other treatment in thread-worms. As the general health is usually below par, it is important to supplement the vermicide treatment by tonics and nutritious food.

The whip-worm (*Trichocephalus dispar*) and the *Sclerostoma duodenale* are rarely seen in this country, although the former is sometimes observed in people who have died of typhus or of enteric fever.

PENTASTOMA (πέντε, five; and στόμα, a mouth).—A genus of entozoa belonging to the family *Acaridæ*. "The species," according to Dr. Cobbold, "two of which are liable to infest man, have a ringed or segmented body, the head being surrounded with four large hooks or claws, arranged in pairs on either side of the mouth. The *pentastoma denticulatum*, infesting the liver, gives rise to no functional disturbances. It is the larval condition of a worm that infests the nasal cavities of the dog—*pentastoma tænioides*."

"*Pentastoma constrictum*, the other human pentastome, infests the liver and lungs. In length it measures half an inch to an inch, being also recognised by the presence of twenty-three rings. From its large size it may produce serious and even fatal symptoms. The entozoon occurs in Africa, and attacks European residents in the West Indies."

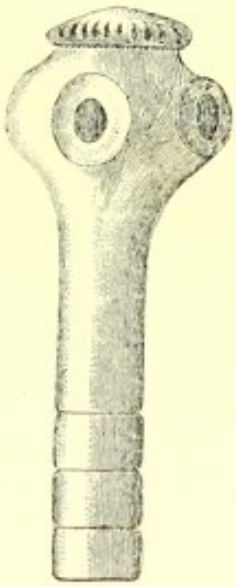
TRICHINA SPIRALIS—TRICHINOSIS.—The *Trichina spiralis* is met with in the muscular tissue in the form of a minute worm, which lies coiled up in the interior of an oval cyst, giving to the naked eye an appearance like minute white grains. These trichinæ are discovered chiefly in the flesh of pigs, and it is from the use of trichinous pork that man has become affected. Pigs again, it is supposed, obtain the disease from rats. The trichinæ cysts are dissolved by the gastric juice, and the parasites set free. Sexual maturity is developed; and the living embryos at once commence active migration, finding their way into the small vessels or lymphatics of the bowels, and thence they are conveyed over the body. In this way they enter the intestine, irritating it in their passage, getting to the intermuscular tissue of the trunk and limbs, and thence penetrating the muscular tissue and destroying it.

Symptoms.—The symptoms attending trichinosis in severe cases are somewhat typical. There is first intestinal disturbance, not unlike that of typhoid fever, with coated tongue, diarrhœa, and great prostration. If fever exists, it is but slight, and accompanied—even from the first—with a remarkable increase of perspiration. Secondly, there is also so-called "muscular lameness," followed by muscular inflammation, pain, and tenderness not unlike rheumatism, with stiffness and rigidity over the voluntary muscles. On the seventh day the diagnosis becomes easier, for there is œdema of the face and eyelids, and this œdema is not attended with albumen in the urine, thus excluding any suspicion of the kidneys being implicated by Bright's disease. The further progress of

TAENIA SOLIUM; HEAD.



NATURAL SIZE.



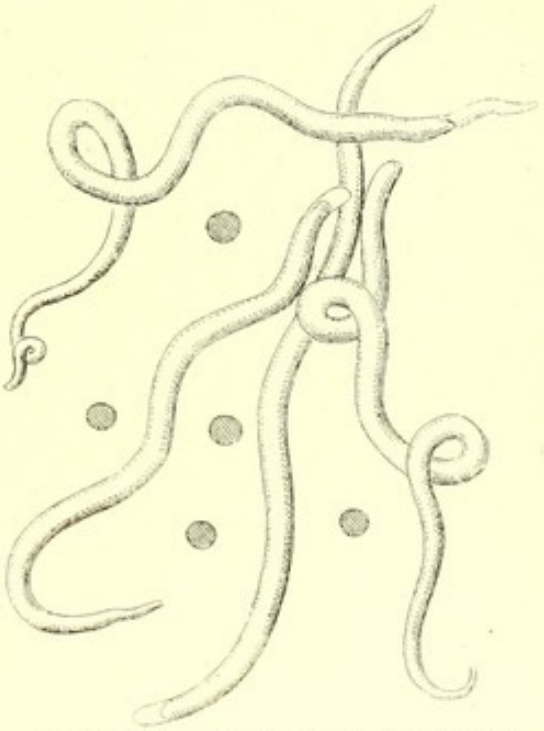
ENLARGED.



SEEN FROM ABOVE.



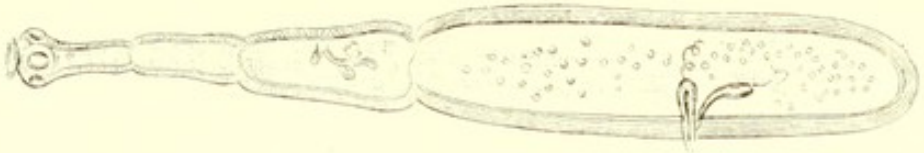
HOOKLET.



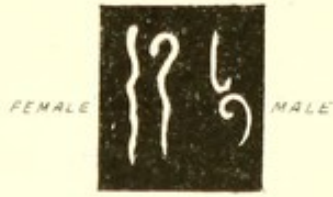
FILARIA SANGUINIS HOMINIS.
MUCH MAGNIFIED.



TRICHINA SPIRALIS IN MUSCLE.



TAENIA ECHINOCOCCUS.
MAGNIFIED.



OXYURIS VERMICULARIS.
NAT. SIZE.

the disease is marked by general prostration, attacks of dyspnœa, hoarseness, profuse sweats, and sleeplessness.

It is difficult to form a positive prognosis in any single case of trichinosis, for its severity, duration, and termination depend upon the number of trichinæ introduced into the system by the meat eaten, and this again varies with its mode of cooking. The less thoroughly the meat is prepared, and the less it is exposed to heat, the more severe will be the illness, and a more unfavourable prognosis will also extend to those cases where the early symptoms are violent than when they are mild and long delayed. Long-continued diarrhœa and pre-existing disease are especially unfavourable. In some cases recovery may take place in a month, in others it may require three or four. In some outbreaks the mortality is small, in others it is as high as 25 per cent, and death may result from peritonitis, pneumonia, or debility.

Treatment.—We can only treat symptoms, as we know of no remedy specially adapted to kill the parasites. A common-sense prophylactic precaution is to avoid raw or underdone pork or German sausages.

DISEASES OF THE LIVER AND GALL-BLADDER

The liver, the largest gland in the body (weighing about 50 ounces), is situated mainly in the right hypochondrium, but its left lobe extends into the epigastric region. Its convex upper surface is applied to the corresponding concavity formed by the diaphragm. Its concave and irregular under surface is in contact at different points with the hepatic flexure of the colon, the right kidney, the duodenum, and the pyloric end of the stomach. The liver is almost completely invested by the peritoneum, but a small part of the posterior surface of the right lobe is destitute of peritoneal covering owing

to the separation of the layers of the coronary ligament at that part. On the right side its upper border corresponds to a level of about $1\frac{1}{2}$ inches below the nipple; on the left of the middle line it is somewhat lower. Its lower margin on the right side in front corresponds pretty much to the margin of the ribs, and this margin extends across the epigastric region at a level of about 2 inches below the xiphoid cartilage. In the axillary line its lower margin corresponds to the tenth intercostal space as a rule. Behind, its lower margin corresponds to about the eleventh rib. (Average extent of hepatic dulness to superficial percussion: middle line in front = $2\frac{1}{2}$ inches, nipple line = $3\frac{1}{2}$ to 4 inches, axillary line = nearly 5 inches.) Quantity of bile secreted daily by a healthy adult is calculated at about $3\frac{1}{2}$ lbs.

In considering affections of the liver we shall proceed in the following manner:—

1. Lithæmia, jaundice, gallstones.
2. Painful enlargements: hyperæmia (congestion), cancer, abscess.
3. Painless enlargements: amyloid, fatty, hydatid tumour, simple hypertrophy.
4. Contractions: simple atrophy, acute yellow atrophy, cirrhosis.
5. Syphilitic disease.

Lithæmia.—In certain cases of bilious or hepatic dyspepsia there is not only a defective secretion of bile but also an interference with the normal processes by which albumen is disintegrated in the liver. The result is that instead of urea, uric acid, a less perfectly oxidised body, is formed. The comparative insolubility of this body and of its salts prevents it being readily excreted by the kidneys like urea. Hence it accumulates in the blood, and a condition arises which has been termed by Dr. Murchison LITHÆMIA.

Symptoms.—The symptoms are a bitter or coppery taste in the mouth, especially in the morning, intestinal hæmorrhage, cramp in the abdomen, aching pains in the limbs, lassitude, drowsiness, and headache, dull and heavy,

most commonly seated in the forehead. Graves has also noticed a tendency to grind the teeth, and Murchison has observed, as arising from this, hepatic derangements, severe spasmodic twitching of the limbs and noises in the ears. There may also be sleeplessness, or sleep disturbed by unquiet dreams, palpitation and fluttering of the heart, with irregularity and intermission of the pulse.

Treatment.—Quinine, antipyrin, and other remedies of this class are here valueless, and even injurious, while four grains of blue pill and a grain of the compound extract of colocynth at night, followed by a black draught in the morning, give unquestionable relief, or four grains of euonymin. It is advisable also to take for some time in the early morning, an hour before breakfast, those mineral waters which contain the sulphate of sodium, as Püllna, Friedrichshall, or Carlsbad. The dose of these waters depends on circumstances, as some require a large, others a small quantity, but the object aimed at is simply to secure a free and full action of the bowels. Many with advantage stop these waters after a course of six or eight weeks, while others continue to take them regularly for four or five years, and find themselves better by doing so. In cases of this kind nitro-hydrochloric acid with taraxacum and gentian is very serviceable (F. 79*a*).

Dietetic.—Champagne, beer, and malt liquors should be interdicted, and the patient should be limited to a moderate allowance of claret or hock with his principal meal, or to a small quantity of sound whisky largely diluted with water. Riding on horseback, rowing, and dumb-bell exercise seem preferable to walking in this form of hepatic dyspepsia.

JAUNDICE

When from certain affections of the liver, or from causes connected with other parts of the body, the secretion or the excretion of bile is interfered with, jaundice results. The term Jaundice is derived from the French word

jaune, yellow. *Icterus* (the Greek word for the golden thrush), another synonym, originated in the ancient idea that the sight of this bird by a jaundiced person was death to the bird but recovery to the patient. The affection has also been termed "regius morbus," from the royal and pleasant regimen then prescribed for those who had it.

Irrespective of the causes of jaundice, there are general symptoms which are very apparent. The colour of the skin is changed, and varies from a light yellow, through citron yellow, to a deep olive or bronzed tint. The conjunctivæ become yellow, and the secretions (especially the urine) acquire a saffron-yellow, greenish-brown or brownish-black tint, according to the amount of pigment present. The tests for bile in the urine are given at p. 379. The cutaneous glands also, in assisting the kidneys to eliminate the pigment, sometimes stain the linen yellow. Instances have been recorded where the secretion of the mammary glands has been found tinged with bile pigment, and still rarer cases have been noticed where the saliva and the tears have been similarly affected. On the other hand, the bile pigment is not eliminated by the mucous membranes of the respiratory passages or the digestive tube. A bitter taste is not unfrequently complained of, and derangements of digestion are indicated by flatulence, constipation, and an altered condition of the fæcal evacuations. We can account for the digestive derangements by the knowledge we possess of the action of the bile. Bile is a natural aperient, and its absence causes as a rule constipation, and makes the motions assume a pale clay-colour; but it is to be noted that in cases of jaundice, where there is no obstruction of the common bile duct, the motions may be but little altered. The function of digestion is normal, except in regard to fatty matters, and when substances containing fat are taken the fat is mainly found unaltered in the fæces. There is generally a sleepy, drowsy sensation. Cerebral symptoms, such as convulsions, coma, and delirium, occasionally supervene (if the jaundice continues

long), and are probably due to waste products, such as urea and uric acid, accumulating in the blood. Itchiness of the skin without any eruption may be experienced, but at times urticaria, lichen, boils, and carbuncles are observed.

These are the general symptoms of jaundice, but in a large proportion of cases which may be called *Simple Jaundice*, we can ascertain hardly anything, whether by questioning the patient or by physical examination, beyond the facts that the skin and conjunctivæ are yellow, that the urine contains much bile pigment, and that the motions are clay-coloured. There is no pain or uneasiness in the region of the liver, and the patient only observes that his colour is changed by the remark of a friend, or by seeing his yellow face in the glass. There is, however, one symptom which is observed in this form of jaundice, viz. *retardation of the action of the heart* as evidenced by a slow pulse, which may fall to 50, 40, or even 20 beats in the minute. This should not modify a favourable prognosis by the dread of the supervention of cerebral symptoms, as such rarely occur; and after a variable period the jaundice subsides.

There is another form of jaundice, distinct from simple jaundice, though sometimes grouped with it, which is due to catarrh of the bile ducts, and hence termed *Catarrhal Jaundice*. In the majority of cases the disease is due to a catarrhal affection of the duodenal mucous membrane, combined with acute or sub-acute catarrh of the stomach and intestines. This catarrh spreads to the intestinal opening of the common bile duct, and is propagated to the capillary bile ducts and to the gall-bladder. The factors, therefore, which give rise to gastro-duodenal catarrh and to catarrh of the bile ducts are the same, and prominent among these factors is a "spoiled stomach," originating from undigested food, too hot or too cold drinks, acid substances or strong spirit. It may also be caused by cold or exposure, notably in the spring and autumn months, when there are sudden and frequent variations of temperature; by atmospheric influences

proceeding from a defective drain-pipe, or from decomposing substances; by certain poisons, as phosphorus; by certain diseases, as typhus, cholera, lobar pneumonia; by direct irritation of the biliary passages due to accumulated bile occurring after prolonged fasting, or from round worms. In some instances fright and mental anxiety give rise to this form of jaundice, and its occasional appearance in an epidemic form has led to its being termed "epidemic jaundice."

It attacks both sexes equally, and is more frequent in youth than in old age.

Symptoms.—There is little local pain, and not much constitutional disturbance. The first symptoms are a furred tongue, loss of appetite, nausea, slight feverishness with constipation as a rule, but sometimes with a little diarrhœa. Jaundice sets in after the lapse of three or four days, and indicates that the catarrh of the stomach and the intestines has spread to the biliary passages. The catarrh closes the ducts by inflammation of the mucous membrane or by tough plugs of mucus, but this obstruction may be only partial. Hence the stools may be colourless or coloured, the skin may be affected by much or little discoloration, and the appearance of bile in the urine may be marked or slight.

Duration.—Ordinary cases have a duration of about four weeks; milder cases may terminate in ten days; while cases occasionally occur which last three or even four months.

Prognosis.—This is generally favourable in simple cases, and the recovery is complete. But if the catarrh be due to acute phosphorous poisoning, or accompanying cholera, typhus fever, or pneumonia, then it depends on more serious diseases, and the prognosis is associated with the extent and gravity of these affections.

After these observations of jaundice we are now in a position to discuss the etiology of the disease.

Etiology.—All cases of jaundice may be accurately grouped under two heads :—

1 Jaundice resulting from obstruction of the bile duct.

2. Jaundice independent of any obstruction of the bile duct.

Under the first head, without entering into full details, we may say that the most common cause is gallstones. Next, catarrh of the bile ducts; foreign bodies from the intestines; stricture of the bile duct; obstruction by tumours pressing on the duct, as tumours of the liver, stomach, pancreas, kidney; abdominal aneurysm; accumulation of fæces in the bowels; a pregnant uterus.

Under the second head are (1) Poisons interfering with the normal metamorphosis of bile, *e.g.* those of various specific fevers, or the taking in poisonous doses of phosphorus, mercury, antimony, etc. (2) Impaired or deranged innervation, interfering with the normal metamorphosis of the bile, such as may proceed from severe mental emotions, as fright, anxiety, a disgusting object, concussion of the brain. (3) Excessive secretion of bile, more of which is absorbed into the blood than can undergo normal metamorphosis, as from congestion of the liver, mechanical or active. (4) Undue absorption of bile into the blood from habitual or protracted constipation.

Theories as to Causation.—With regard to cases which are due to obstruction of the bile duct there is not much dispute, as the jaundice then is obviously dependent upon the bile which has been secreted being reabsorbed into the system; but with reference to the causation of jaundice independent of this obstruction there is much controversy. We shall not refer in detail to the conflicting theories, but we may state that Frerichs's explanation of this, adopted by Dr. Murchison, seems to be the most plausible. It proceeds on the supposition that even in health, in addition to the bile that passes away by the fæces, a greater or less amount is reabsorbed into the system and is at once transformed. But in certain morbid states this transformation does not occur, and hence the bile circulates in the blood, and gives the jaundiced hue to the skin and other tissues.

Diagnosis.—The question whether or not the jaundice

is due to obstruction of the bile duct is decided by the following considerations :—

(1) If obstruction exists the stools are clay-coloured, a tumour corresponding to the region of the gall-bladder favours the idea of obstruction, and, further, the jaundice produced by obstruction is not slight but intense.

(2) The mode of commencement of jaundice gives an important clue, for if it begins suddenly in a person whose previous health has been good, and if it be attended by colic, vomiting, and clay-coloured stools, then it is most probably due to obstruction of the duct by a foreign body. And this view is strengthened if there be a history of previous attacks of jaundice of a similar character.

(3) Pain, severe and paroxysmal, points to gallstones or cancer. The cancerous cachexia, the history of failing health and emaciation before the pain sets in, indicate cancer.

(4) Jaundice occurring with enlargement of the liver is most probably due to cancer or cirrhosis, and this supposition is confirmed if there be ascites. The diagnosis of the latter is assisted by a history of alcoholic dyspepsia and the previous habits of the patient. Then it will depend on cirrhosis. If there be no evidence of over-indulgence in stimulants, and if there be darting pain, it will probably depend on cancer.

(5) Jaundice accompanied by fever is either secondary to some acute febrile disease or is due to an abscess of the liver dependent upon *pylophlebitis*, or to a suppurating hydatid tumour opening into a bile duct, or to inflammation of the bile ducts. The fever in these cases is persistent, while in that which occurs from gallstones it is temporary.

(6) Jaundice with cerebral symptoms is due to acute atrophy of the liver, poisoning by phosphorus, some specific fever, lobar pneumonia, or nervous shock.

(7) Jaundice in a young person, if it be preceded by symptoms of gastric catarrh, is generally catarrhal.

Treatment.—The obstruction in *Catarrhal Jaundice* may be temporarily overcome by an emetic, but it will

not be permanently removed, and in the majority of cases the treatment must be expectant and directed to the symptoms. Constipation must be corrected by sulphate of sodium, hydrargyrum c. cretâ, and rhubarb ; and diarrhœa by small doses of Dover's powder. If no fever exists exercise in the open air is preferable to remaining in doors, and warm poultices at night over the liver are serviceable if pain be present. When the flow of bile is re-established frequent warm baths should be taken to remove the yellow condition of the skin and to relieve the itching which is sometimes present. If the disease lingers long, the waters of Carlsbad, Marienbad, or Homburg are indicated. In *Simple Jaundice* the same line of treatment should be adopted.

Diet.—The diet should be spare, and consist of soups and light puddings with cooling acid drinks.

Gallstones.—Gallstones result from the precipitation of certain substances held in solution in the bile—the precipitate, whether amorphous or crystalline, uniting to form larger or smaller concretions. They are formed chiefly in the gall-bladder, and their number is variable, usually from five to ten. Sometimes the number given is greatly exceeded, reaching to a hundred or several hundred, of the size of a pea. Practically, biliary calculi may be divided into "small stones," from the size of a pea to a grain of sand ; "medium-sized," from the size of a pea to a hazel-nut ; "large stones," usually single, from the size of a walnut and even up to the dimensions of a moderately filled gall-bladder. Their shape is variable, but in general they are round or egg-shaped, and if they are multiple facets are observed on them, whilst their corners are rounded off. Their flat surfaces appear ground, and are either plane or slightly concave or convex. They are in colour usually brown, greenish, or yellowish brown. They are somewhat greasy to the touch, and in consistence slight, so that they can easily be nicked with the finger nail. As their specific gravity is usually 1027 they cannot float in the bile, the specific gravity of which is from 1020 to 1026.

Structure and Composition.—In structure they are occasionally simple, consisting of pure crystallised cholesterine, bile resin, or cholesterine and soap; or they may be compound and nucleated, with a shell surrounding this nucleus, and a crust or rind.

The chemical composition of compound biliary gall-stones consists of substances found in the bile, or of the decomposition of substances found there, viz. cholesterine from 70 to 80 per cent, biliary colouring matter, biliary acids and their salts, fatty acids, and lime, especially in the form of the carbonate.

How do they originate? In decomposition and stagnation of the bile, by which certain substances, notably cholesterine, may so increase that the bile can no longer hold them in solution; or from acidity instead of alkalinity of the bile permitting it to precipitate; or from the natural solvents hastening the same result by being present in insufficient quantity. Numerous conditions favour their formation. They are rare below the age of twenty-five, tolerably frequent after forty, and relatively to these ages most numerous in old age; and with regard to the sexes, they are seen in females more frequently than males, the proportion being 3 : 2. Sedentary habits predispose to them, and it is asserted their occurrence is sometimes hereditary; a faulty luxurious diet begetting corpulency, and an extreme interval between meals allowing the bile to be retained too long in the gall-bladder, undoubtedly act as conducers to their formation. And to these must be added tumours pressing on the biliary passages, inflammation or degeneration of the gall-bladder, catarrh of the ducts, or any circumstance which tends to block up their channels and retard the flow of bile.

How are they evacuated? Naturally through the excretory duct of the liver or gall-bladder into the ductus communis choledochus, and thence into the intestinal canal, whence they usually escape per anum; occasionally they leave this natural path, and by ulceration and perforation reach various and often far distant parts of

the body. Thus they may be found in the liver itself or hepatic duct; they may pass from the gall-bladder into the stomach or colon, or from the biliary passages into the duodenum. They may wander into the urinary passages, the interior of the portal vein, or the cavity of the abdomen. When they have reached the intestine they may become impacted, and give rise either to intestinal obstruction, or may cause perforation of the intestines.

So long as gallstones lie quietly in the gall-bladder they may give rise to no prominent symptoms, but the situation is altered when they are set in motion and advance through the excretory duct towards the intestine. Then their passage may give rise to what is termed "biliary" or "hepatic colic." With this colic there is pain setting in sharply and suddenly, beginning at the epigastrium and radiating upwards towards the right shoulder-blade. The pain occurs in paroxysms, and is described as being boring, burning, or tearing, and women say that it is greater even than labour pangs. There is also vomiting, at first of the food in the stomach, and, if there is complete obstruction of the duct, of colourless acid fluid, or of bilious matter if the obstruction is removed. After from twelve to twenty-four hours of pain and vomiting, if the obstruction remains, jaundice more or less pronounced results. The urine becomes of a dark brown mahogany colour, and the fæces are pale. Permanent closure of the duct is rare, and the jaundice does not last long,—a couple of days, or at most a couple of weeks. Severe attacks have been known to terminate in collapse and death, but this is rare, and the recurrence of the colic seems to depend on varying causes, and to follow at no well-assured intervals.

Treatment.—The object of the treatment is obviously to moderate the pain and to facilitate the passage of the stone by increase of the biliary secretion. Morphine injected hypodermically certainly lessens the pain, but it has the disadvantage when used of diminishing the biliary secretion, and, in some instances, of exciting vomiting,

which is followed by alarming collapse. Antipyrin only renders mediocre service, and time should not be lost by prescribing it. The inhalation of chloroform eases the pain, and possesses the advantage of not hindering the secretion of bile; it also relaxes the muscular fibres of the bile duct. Chloral has an equally good action, but it should be administered as an enema, since in this painful affection it is not well to trust to its slow action when given by the stomach. To increase the biliary secretion salicylate of sodium should be given with large quantities of fluid, as the latter seems to increase the action of the sodium salt. Olive oil has also a cholagogue effect, and promotes the removal of the gallstone, and relieves the attendant pain and jaundice. The chief objection to its use is that it is not well tolerated, and that if it be well borne at first intolerance is quickly excited.

Whatever medicinal remedies may be selected, it is, from all experience, evident that copious draughts of warm water to which a little bicarbonate of sodium has been added are invariably advantageous. So also hot poultices or fomentations applied to the hepatic region do good. When these are not well borne, ice finely chopped and placed in a bladder may be tried. If there be vomiting, ice may be sucked or iced champagne given in small quantities at a time. After the crisis is over, but not till then, a saline aperient should be ordered to clear away the bile that has found its way into the intestine. The tincture of podophyllin given occasionally appears to hinder the re-formation of gallstones. To dissolve gallstones already formed, spirit of ether 30 to 60 m., or 5 or 6 m. of oil of turpentine mixed with the yolk of an egg, have long had a deserved reputation. This mixture should be continued until there is no yellowness of the eyes, and no pain felt in the hepatic region after taking food or exercise. If a gallstone become impacted in the common duct, and the measures mentioned fail, it may be necessary to perform the operation of *cholecystotomy* or opening the gall-bladder for the removal of calculi. It may be recommended when the

gall-bladder can be felt below the costal margin, and when there are urgent symptoms pointing to the presence of a calculus. "If there be jaundice the indications for the operation are not so clear, as the calculus has certainly passed beyond the cystic duct. Yet in some cases it has been found possible to press it back again into the gall-bladder, or to crush it *in situ* and remove the fragments through the opening of the gall-bladder."

Dietetics.—As acidity with indigestion and superabundance of bile are probable causes of the re-formation of concretions, it is necessary to enjoin abstinence from substances which contribute to make the urine yellow and notably acid, *e.g.* salads, highly-spiced food, asparagus, and excess of animal food. A moderate use of fruits is recommended. If circumstances permit, the patient will obtain marked benefit by going at the proper season to take at their sources the waters of Carlsbad, Kissingen, Homburg, or Vichy.

PAINFUL ENLARGEMENTS OF THE LIVER

We shall now consider Painful Enlargements of the Liver: hyperæmia (congestion), abscess, cancer.

HYPERÆMIA OF THE LIVER (*Synonym*, Congestion of the Liver).—The phrase "congestion of the liver" is often used vaguely, and applied to cases of indigestion when there is probably little amiss with the organ. Yet we must recognise two forms of hyperæmia of the liver,—mechanical and active.

Mechanical.—This condition is wont to supervene on a variety of serious affections of the heart and respiratory organs. Incompetence of the tricuspid or stenosis of the mitral valve is the most frequent cause, for pressure on the inferior vena cava then takes place, and is followed by arrest of the circulation in the hepatic veins. Pleuritic effusions, emphysema, and chronic bronchitis may also induce hyperæmia.

Active.—This depends on errors of diet in people

who lead a sedentary life and at the same time eat too much or too frequently, or drink too heavily. It may also arise from contusion, or severe concussion of the organ; from infectious disease; from suppression of habitual hæmorrhages as the menses, or bleeding from piles; from malarious or other poisons.

Symptoms.—In the early stage of the *mechanical* form the liver may become much enlarged, while in a later stage, through atrophy and degeneration, its usual size is diminished. The obstruction from the hepatic veins to the portal vein occasions hyperæmia of the walls of the digestive tract and gastric symptoms arise, viz. slow digestion and retarded peristaltic action. Jaundice appears to a greater or less degree on the body, and the face has a slightly livid hue.

In the *active* form the liver does not extend much, if at all, below its usual limit. There is tenderness on pressure, and the patient speaks of a sense of oppression and fulness over the hepatic region, and of an uneasy feeling rather than actual pain, which radiates from the organ to the right shoulder. This feeling is sometimes increased to actual pain after meals, or when he lies in bed on his right side. Disorder of digestion is manifested by a furred tongue, loss of appetite, nausea, or vomiting, and at times griping pain is experienced in the abdomen, when loose bilious motions are passed. Headache, lassitude, and depression of spirits are complained of, and though jaundice is rare, the countenance becomes sallow. The urine is high-coloured and loaded with lithates.

The *prognosis* in the mechanical form will be influenced by the nature and stage of the chest disease. In the acute form when it occurs in this country the prognosis is favourable, but when the affection attacks a European living in India it may, according to Dr. MacLean, be the forerunner of acute inflammation of the liver.

Treatment.—In the *mechanical* form we must endeavour to remove, as far as possible, the cause. The hyperæmia may be relieved by saline purgatives, or by calomel. In the *active* form hot fomentations and an

active purgative as calomel and jalap (F. 23) do good service at first. The medicinal treatment afterwards consists in giving (1) bicarbonate of potassium until the lithates disappear; (2) dilute nitro-muriatic acid 10 to 20 drops thrice daily with taraxacum or gentian. This acid promotes the biliary secretion and improves digestion.

Dietetic and Climatic Treatment.—The diet should be as simple as possible—stimulants and butcher meat forbidden. The springs of Harrogate or Marienbad are useful.

Abscess of the Liver.—This is rare in our country, but it may be secondary to other diseases seen here. Thus a hydatid cyst may suppurate and form an abscess. Pyæmic or metabolic abscesses may arise from surgical operations, or be seen in connection with gangrene of the lung or ulcerative endocarditis.

It is not uncommon in the tropics, and occasionally occurs in those who have come home after a residence in the East. It appears to be intimately associated with dysentery—the inflammation of the colon extending to the liver. Many doubt if an abscess of the liver can occur without dysenteric inflammation, as only a few cases are reported where this was absent. Hence it is termed "tropical abscess."

Symptoms.—The local symptoms in pyæmic abscess are often marked by the grave constitutional symptoms which pyæmia engenders, and the implication of the liver may only be revealed at a post-mortem examination.

In some cases of Tropical abscess the local symptoms are not much manifested, but in the majority of cases there is local pain, a sense of fulness and weight, fever, evident enlargement of the liver, sometimes with jaundice, and afterwards a fluctuating tumour is detected in the organ. The pain is variable in degree, and is sometimes only present in the shoulder. Reflected irritation also occasions a short and dry cough. The abscess may burst into the peritoneal cavity, giving rise to fatal peritonitis,

or it may open into the biliary ducts and be discharged by the duodenum. Much more frequently the termination of the abscess is by pointing and opening externally, or by opening into the colon. If it opens into the pleura or pericardium a fatal result will ensue, but if it be into the lung, the issue is more hopeful.

Treatment.—If due to acute hepatitis, without suppuration being evident, Indian authorities agree in recommending ipecacuanha in doses of from 15 to 20 grains at intervals of five, six, or eight hours, with hypodermic injections of morphine and the application of poultices to relieve the pain. If the diagnosis of an abscess be established, nothing is to be feared and everything is to be gained by an early insertion of the aspirator of Dieulafoy, and withdrawal of the pus. Even if the trocar does not touch any pus, marked relief may be afforded by its introduction into an inflamed liver.

Cancer of the Liver.—The enlargement is great and progressive, and nodular excrescences, irregular, hard, and resistant, can often be detected on palpation. Pain is always a prominent symptom. In a large number of cases jaundice results from compression of the bile duct by cancerous nodules in the liver, or by enlarged glands in the portal fissure, and when jaundice does appear it is persistent. In about one-half of the cases fluid is observed in the peritoneum at a late stage of the disease. In fully three-fourths of the cases the cancer is not primary but secondary to the same disease in some other organ, as the stomach, uterus, rectum, or female breast. The course of the disease is rapid. If medullary it is fatal within a few weeks or months, and if it be hard, it is rarely prolonged beyond twelve months. It is uncommon before the thirty-third or fortieth year.

PAINLESS ENLARGEMENTS OF THE LIVER

Hypertrophy of the Liver.—We understand by this enlargement of the organ, which is brought about by an increase in the size or the number of the secreting cells. In the former the acini are uniformly enlarged; in the latter this is not necessarily the case. The hypertrophy may be partial or general. Partial hypertrophy may arise from tight lacing, or it may be compensatory to some other portion of the liver reduced or destroyed by disease as in syphilitic hepatitis. General hypertrophy has been found in some cases of diabetes mellitus, where it is probably connected with an increased and quickened formation of glycogen in the hepatic cells and in leukæmia. It is also observed in Europeans who have for some time resided in hot climates, and sometimes in full-grown, vigorous men, who in any country have been addicted to taking stimulants or food in excess.

Waxy Liver.—Excepting perhaps cancer, the liver here undergoes greater enlargement than from any other disease, so that instead of 50 ounces, it may increase to 150 or 160 ounces. It may be recognised by the following characters:—(1) By its great enlargement. (2) By its growth being uniform in every direction, and by its dense, firm, and resistant feel to palpation in the portion of the organ which extends below the margin of the ribs. (3) By the absence of pain or tenderness and the presence only of weight or tightness in the right hypochondrium. (4) By its slow and gradual growth, and by the spleen being as a rule also enlarged.

The general symptoms are those of anæmia and debility. The quantity of the urine is increased, it has a low sp. gr. and contains a large quantity of albumen; under the microscope, hyaline casts are observed. The conditions which favour its occurrence are long-standing purulent discharges from diseased bones or joints, constitutional syphilis, tubercle of the lungs or intestines,

chronic constitutional diseases of long standing which seriously impair the general nutrition, as protracted ague or dysentery.

Treatment.—It is essential to prevent its occurrence by removing the causes which favour its appearance. Thus in protracted suppuration, remove diseased bone; in constitutional syphilis and dysentery, prescribe the appropriate remedies. When the disease is established the diet should be nutritious, an allowance of alcoholic stimulants is useful, and, when the condition is not too far advanced, removal to a mild or equable climate is to be recommended. Of medicinal agents, iron, nitro-muriatic acid, tincture of iodine, and cod-liver oil are most favoured. If dropsy has set in, acetate of potassium and digitalis should be given.

Fatty Liver.—The increase of the liver here is due to the accumulation of oil in the organ. Two opposite conditions may give rise to this. These are — 1*st*, When the nutrition of the system is too great as in obesity, and when, with little exercise, excess of alcoholic stimulants is taken; 2*d*, when the nutrition of the system is too little, as when wasting disease exists, as in phthisis, cancer, ulcer of the stomach, and chronic dysentery. Its production in the first condition is easily understood from the general plethora which exists; in the second, the system feeds on its own resources, the blood becomes loaded with oily matters derived from the patient's tissues, and this oily matter is separated in the passage of the blood through the liver. As was the case in waxy disease, the enlargement here is tolerably uniform in all directions, so that the natural form of the organ is little altered. The outer surface is smooth and the lower margin rounded. It is flabby to the touch, and when the abdominal parietes are thin its soft doughy consistence can be readily appreciated. There is no ascites and no jaundice, and from first to last the enlargement is unattended with pain. The skin is almost semi-transparent and waxy in appearance, and becomes,

according to Dr. Addison, especially in females, "so exquisitely smooth and soft as to convey a sensation resembling that experienced on handling a piece of soft satin."

If the disease be of plethoric type, and if it be associated with fatty degeneration of the heart, then the cardiac impulse is feeble, the sounds faint, the pulse slow or quick, feeble and irregular. If it be associated with fatty degeneration of the kidney, then the urine will be scanty, containing much albumen and tube-casts, with a tendency to general anasarca and extreme pallor of the countenance.

HYDATID TUMOURS in man are developed from the eggs of a tapeworm which enter the body from without. This tapeworm—the *Tænia echinococcus*, the length of which does not exceed a quarter of an inch—has only four segments, the ova being contained in the last. It inhabits the intestines of the dog, and the ova are voided in the fæces of the latter, and subsequently find their way into the human body in drinking water or upon the leaves and stems of young vegetables. Arrived in the intestines, they are developed into embryos which penetrate into the liver and other parts, and proceed to develop themselves into a hydatid.

The ova of *Tænia echinococcus*, however, develop in other animals than man, and especially in sheep. The echinococci of sheep are set free in the process of slaughtering, and are devoured in the offal by dogs, to be again developed into tapeworms. The disease in man is kept up by the cycle of infection between dogs and sheep.

Consequently, for the prophylaxis of hydatid tumours in man, dogs should be prevented from feeding on the offal of sheep. They should be rigidly excluded from slaughter-houses and their meat should be thoroughly boiled. Further, as far as possible, it would be well periodically to purge dogs with a vermicide such as areca nut powder, and to burn or bury their excreta. It is a noteworthy fact that hydatids cause one-seventh part of

the human mortality in Iceland, and this is doubtless due to dogs there being closely huddled up together in crowded dwellings with human beings during the winter months.

In hydatid tumours of the liver the organ is not increased in every direction. The increase usually follows one particular direction—upwards, downwards, or laterally, and the cyst may burst into the peritoneum, stomach, intestine, or lung. Sometimes it may suppurate, or it may dry up. The commencement is usually insidious, and the tumour, smooth and elastic, may attain a great size without the patient being aware of its existence, as the general health may be unaffected, there being neither dropsy nor jaundice.

Diagnosis.—When detected, the painlessness and the absence of the peculiar cachexia distinguish it from cancer; the history and the absence of constitutional symptoms from abscess; the position and non-jaundiced appearance of the patient from enlarged gall-bladder. Occasionally, if near to the surface, there is a sign elicited by percussion, known as "hydatid vibration," characterised by a peculiar trembling sensation being imparted to the three fingers of the left hand when they are laid flat on the tumour, and the back of the left middle finger is struck abruptly with the point of the middle finger of the right hand.

Treatment.—In *fatty liver*, if dependent on indolent habits, an anti-saccharine or a Banting dietary with exercise must be enforced, and if due to alcohol, withdrawal of stimulants. In both cases, alkalies with taraxacum are useful, or (F. 10); and, if circumstances permit, the waters of Carlsbad, Marienbad, or Homburg can be strongly recommended. Iodide of potassium and common salt were at one time considered serviceable in *hydatids* of the liver, but subsequent experience has not confirmed the hopes held forth, and it is now deemed advisable, if the tumour is increasing, to puncture and remove the liquid contents of the cyst by a fine trocar and canula. This being done, both the parent hydatids

and the offspring die. Out of forty-six cases reported by Dr. Murchison, thirty-five appear to have been treated in this way with perfect success. It is necessary only to withdraw a portion of the fluid to cause the death of the hydatid, or one or two fine needles may be inserted into the cyst, and may either be left in it for ten minutes and then carefully taken out again, or they may be connected with a galvanic battery, the current from which is allowed to pass through the tumour for ten minutes before the needles are withdrawn.

CONTRACTIONS OF THE LIVER

The area of hepatic dulness may appear diminished although the organ retains its normal weight and bulk. Such contractions may be considered spurious, and the main conditions likely to indicate an apparent diminution are as follows: Tympanitic distension of the bowels, and particularly of the transverse colon and stomach. This may prevent the lower margin of the liver being felt. So also, in cases of ascites, the fluid in the peritoneum may so push up the bowels as to produce a similar result. Further, the hepatic tissue may be preternaturally soft, so that the organ may fold on itself and collapse against the spine and back part of the abdomen, in which condition it may be covered more or less by the stomach or the bowels.

True contraction of the liver exists in (1) simple atrophy; (2) acute yellow atrophy; (3) cirrhosis.

1. Simple atrophy. In this case there is no real disease of the liver, but merely a diminution of its size, which may be to the extent of nearly one-half. The circumstances under which it occurs are chiefly the result of old age or of inanition, the latter being dependent on an insufficient supply of food from actual want; defective assimilation arising from other diseases as cancer; pericardial or pleuritic effusions; tight lacing. Under this head we may state that Dr. Murchison has described a

form of atrophy with nodulated surface but without any cirrhosis. This atrophy may occasion ascites, and may not during life be distinguished from cirrhosis of the liver. Perihepatitis, or inflammation of the capsule of the liver, may also produce atrophy, and ascites, by compression of the liver and obstruction to the portal circulation, may produce a similar result.

2. Acute yellow atrophy. In this fortunately rare disease the liver undergoes a rapid degeneration of its tissue, and diminution of its size to two-thirds or one-half its normal bulk. The essential change is a granular and fatty degeneration, and consequent destruction to a greater or less extent of the hepatic cells. On section the liver is of a yellow colour, with patches of bright red. In the yellow parts the destruction is less pronounced than in the red parts, where the degeneration of the tissue is complete, and the vessels are alone left to represent the substance of the liver. Under the microscope nothing may be seen but granules of albuminous matter, fat, and pigment, and larger globules of fat.

Causes and Symptoms.—It is often preceded by great mental emotion, and, as a rule, occurs only in women who are pregnant, or where a female has led a dissipated life, or who has had constitutional syphilis. Gastric catarrh and bilious vomiting are followed closely by jaundice and pain in the hepatic region. After two or three weeks, cerebral symptoms supervene, as headache, delirium, and gradually-developing coma with convulsive twitchings. The urine, which is generally albuminous, exhibits a remarkable decrease in the amount of urea, uric acid, and salts, and the presence of two new compounds—leucin and tyrosin. Pregnant women as a rule abort. After the severe symptoms set in death occurs in from two to four days.

Diagnosis.—This is difficult until the cerebral symptoms commence, when it is generally easy. Poisoning by phosphorus leads to the same degeneration of the liver, and is attended with similar symptoms. The history of the case, and the detection or non-detection of

leucin and tyrosin in the urine, form important points in diagnosis.

Treatment.—This is unsatisfactory and in the main directed to the symptoms, as in relieving pain. The disease is always fatal.

CIRRHOSIS

Cirrhosis, the so-called gin-drinker's or hobnailed liver, derives its name from κιρρός, yellow, the colour being due to the large amount of yellow pigment found in the secreting cells.

Morbid Anatomy.—The liver is reduced in size, and while there is a general reduction in every diameter, it especially affects the right lobe. The colour of the organ is a pale olive brown, the surface is extremely granular, and the capsule is nodulated and opaque. On section it presents bands of fibrous tissue which traverse the organ in every direction, and between these bands are groups of acini which are often stained yellow. The new formation is observed under the microscope to be due to increase of the pre-existing connective tissue in the portal canals and interlobular fissures and spaces. This encircling growth compresses the acini, induces changes in the latter which in some places cause their transformation into connective tissue. The branches of the portal vein in the portal canal, and of the hepatic artery, are thickened and dilated. Ascites is frequently present. The spleen is generally much swollen, and the kidneys usually present evidence of chronic inflammatory lesions. The mucous membrane of the stomach exhibits a state of chronic catarrh.

It is chiefly met with in adults between 35 and 60, in males more than in females, and is almost invariably connected with a previous history of undiluted spirit-drinking on an empty stomach.

Course and Symptoms.—The disease is chronic, usually extending over several years, and its beginning is insidious;

at first there is probably an increase of size of the liver, but latterly there is a decided diminution in its bulk. In its early stages it is attended with what may be termed *Alcoholic Dyspepsia*, sickness and retching in the morning, loathing for solid food, and a strong desire for stimulants, with some slight pain or tenderness over the hepatic region. The next symptom is not unfrequently *hæmatemesis* or vomiting of blood. This is due to the commencing obstruction in the portal circulation, which leads to congestion of the mesenteric, gastric, and splenic veins, and a tendency to bleed on to the mucous surface of the stomach and intestine. The quantity thrown up is often as much as one or two pints, and the vomiting may be accompanied or followed by the passage of blood per rectum. Hæmorrhoids at the same time are not unfrequently present. The next result of the obstruction is *ascites*, enlargement of the spleen, and the surface of the abdomen is covered by large veins, running between the iliac and thoracic trunks. The disease is now marked by progressive emaciation and debility, by a persistent sallow complexion, though actual jaundice is rare, by increasing dyspeptic derangements, and it results fatally, sometimes by exhaustion attended with coma or œdema and inflammation of the lungs.

Treatment.—In the *early* stages the essential thing is to stop drinking habits. Spirits should be forbidden, although a little claret or hock may be allowed. The diet should consist of milk, eggs, plainly-cooked white fish, game, and meat, while all hot spiced or greasy food must be avoided. Regular exercise should be enjoined, and the action of the bowels facilitated by occasional saline or mineral water aperients, and the use of nitro-muriatic acid. In the *second* stage, though curative treatment is impossible, yet the same dietary must be enjoined. Purgatives and diuretics should be given for the ascites (F. 27, 35); and, these failing, tapping must be had recourse to.

Although the hobnailed or gin-drinker's liver is by far the most common form of cirrhosis, yet pathological

research has shown the existence of other varieties, as I. Cardiac or cyanotic cirrhosis in consequence of prolonged venous hyperæmia, depending upon cardiac or pulmonary disease; II. Biliary cirrhosis, when there is some permanent or protracted occlusion of the common duct as by a calculus; III. Malarial cirrhosis: the indurated and pigmented liver met with in those who have been the subjects of chronic malarial poison; IV. Rachitic, probably a form of congenital syphilis; V. Scarlatinal, as interstitial hepatitis, sometimes observed in the bodies of those who have died from scarlet fever.

Syphilitic Disease of the Liver.—This may be *congenital* or *acquired.*

Congenital Syphilis produces diffuse hepatitis and gummata, the latter being less common.

Acquired Syphilis.—The liver occasionally becomes diseased during the tertiary stage of syphilis, and produces, as in the congenital form, diffuse hepatitis and gummata, but the latter are much more frequent. The gummy tumours—"the encysted knotty tumours" of Dr. Budd—are seen on section of the liver, in its deeper parts, as a number of globular growths, more or less firm in consistence, of a yellowish-white colour, and varying in size from the size of a pin's head to a walnut.

Symptoms.—The size of the liver is enlarged in some cases, contracted in others, and occasionally firm globular elevations can be felt on its surface. Neither ascites nor jaundice are necessarily present, but in particular cases they may occur from the pressure of a gumma upon the portal vein or the bile-duct. Albuminuria, from coexisting lardaceous disease, is often associated with it, and in advanced cases, profuse and obstinate diarrhœa.

Treatment.—In early cases iodide of potassium does good, but if accompanied by lardaceous disease little benefit can be expected from any form of treatment.

DISEASES OF THE PANCREAS

Clinically we know little of the diseases of the pancreas, although doubtless it is subject to pathological processes similar to those that occur in other organs. It lies deeply in the epigastric region, behind the stomach and in front of the aorta, and symptoms connected with it are often referred to other organs, as the liver, stomach, and duodenum. So far as we know at present it may be stated that acute inflammation of the pancreas occurs sometimes in infectious diseases, and that chronic inflammation of it leads to fibrous growth, with consequent atrophy of the glandular structures, analogous to the changes in cirrhosis of the liver. It may also be affected by various forms of degeneration; by concretions of carbonate or phosphate of lime, and by morbid growths, chiefly of the scirrhous variety. Dr. Saundby has lately stated that he considers wasting of the pancreas as the most important lesion in diabetes.

The *symptoms* of any of these diseases are very obscure, yet chronic inflammation may be suspected when, on account of diminution or loss of the pancreatic secretion, the fatty constituents of the food are imperfectly digested and *fatty stools* are passed, in which an oily liquid is present or lumps of white or yellow tallow-like fat.

Treatment.—All special treatment of affections so difficult to diagnose seems out of the question.

DISEASES OF THE LYMPHATIC SYSTEM

DISEASES OF THE SPLEEN

The spleen, situated in the left hypochondrium, weighs about six ounces; its length is six inches, and its breadth rather more than three inches. Its external surface is convex; its internal border, which is concave, is in re-

lation with the cardiac end of the stomach, and has a vertical fissure—the hilus—at which apertures are found for the entrance and exit of vessels and nerves. It has no excretory duct, and its exact purpose in the system is as yet undetermined.

Composed essentially of an elastic fibrous framework (trabecular tissue), of Malpighian corpuscles, and of spleen-pulp, it may become distended with blood from slight causes, especially from those which interfere with the action of the skin, the liver, or the kidneys. These causes continuing, its elastic power may be lost, and it thus becomes unable to send the accumulated blood onward. It may thus suffer from congestion leading to inflammation, abscess, and gangrene. Emboli are apt to lodge in the spleen in the course of typhus fever or pyæmia, giving rise to what are termed "hæmorrhagic infarctions." These infarctions are observed at post-mortem examinations as wedge-shaped masses, with the base towards the surface of the organ. Sometimes their previous existence may be detected by a depressed cicatrix; but in pyæmia they break down into a purulent fluid and give rise to general inflammation of the organ. The spleen also may, though rarely, be the seat of disease of a lardaceous character, which is common, or cancerous, which is rare; or serous and hydatid cysts may form within it. If portal obstruction exists, enlargement of the spleen is a necessary consequence.

The most common form of splenic enlargement, leading to hypertrophy of its tissue, follows the fevers of tropical climates, and is known as "ague cake." The history of the case, the coexistence of intermittent fever or ague, or residence of the patient in the tropics even without having contracted fever, and the marked increase in the size of the organ, form clues to diagnosis. In addition, there are signs of anæmia, debility, a sallow unhealthy complexion, and various digestive derangements. Tenderness on pressure is evinced, but this does not occur to any great extent unless the peritoneal covering is involved. In protracted cases general dropsy sets in, and

a murmur is heard accompanying the first sound of the heart. Sometimes the spleen may be greatly enlarged without any marked disorder of the general health, with the exception of debility.

Treatment.—When the enlargement is the result of ague, change of climate and the administration of quinine are essential. In other cases tincture of the perchloride of iron is serviceable. Arsenic is recommended in cases where there is no fever or periodicity. It can be conveniently given in the form of the iodidum arsenii in $\frac{1}{30}$th gr. doses, accompanied or followed by iodide or bromide of potass, or both (F. 5).

DISEASES OF THE LYMPHATICS

Diseases of the Lymphatic System—Erysipelas, Leucocythæmia, Tubercular affections, Glanders, Chyluria, and Syphilis, although connected with the Lymphatic System, have such sharply-defined characters that we have considered it preferable to treat them under distinct titles. Under diseases of the Lymphatic System we will therefore confine our attention to acute inflammation of this system; and under Chronic Inflammation take up Lymphadenoma (Hodgkin's disease). Tabes Mesenterica, characterised by enlargement of the lymphatic glands of the mesentery, is, for convenience of description and the avoidance of repetition of symptoms, referred to at p. 320.

Acute inflammation presents itself under three forms—(1) of the vessels alone—lymphangeitis; (2) of the glands alone—adenitis; (3) where both are involved.

1. *Lymphangeitis.*—If only the smallest vessels near the point of irritation are involved, the part is red, and the small lymphatic vessels appear as fine wavy red lines. The condition is then spoken of as *Reticular Lymphangeitis.* If the larger trunks be inflamed it is termed simply *Lymphangeitis.* The inflammation in either condition is marked by tenderness and swelling of the surrounding tissues, and may either subside or the vessel may be occluded by

organisation of the clot; or the clot may suppurate and pus escape into the system, and so enter the general circulation; or inflammation may occur in the tissues surrounding the vessel, leading to local suppuration. In either of these latter ways general septic infection may result.

2. *Adenitis.*—An irritant may without injuring them traverse the vessels and become impacted in a gland, which is generally the first one met with. The gland to the touch is tender and at first freely movable under the skin, but if the inflammation continues it involves surrounding tissues and the gland is no longer movable. The swelling may now gradually pass off, or suppuration may supervene and an abscess form. Although the gland nearest to the source of irritation is the most liable to be affected, yet the inflammation may not stop here, but affect a whole chain of glands and the general system. The term "bubo" (*βυβων*, the groin) signifies a swelling of an inguinal gland, which is usually secondary to a chancre of the soft or hard type. If to the former, suppuration as a rule occurs, if to the latter, it does not, and the poison absorbed affects the system.

Etiology.—Acute inflammation of lymphatic vessels or glands originates from some source of irritation within or without the body. *From within*—from inflammation of internal absorbent surfaces, as serous or mucous membranes, joints, bones; *from without*—from wounds, burns, scalds, and friction. The immediate cause, however, is the entrance into the vessels of an irritant such as micro-organisms or cells from malignant growths in the vessels. Micro-organisms, particularly micrococci, are detected in the clotted lymph and endothelial cells, but it is rare to find bacilli in the vessels. On the other hand, in the glands, micro-organisms, micrococci and bacilli, are frequently found, as also are cells, from malignant growths.

Treatment.—The treatment of acute inflammation affecting the vessels and glands of the lymphatics varies according to the cause. It is essential in all cases, however, to get rid of the cause if possible, and to place the

affected part in such a position as to avoid pressure or tension. If the condition be due to septic causes, the system must be supported from the first, as the state of matters is exceedingly grave. Sulph. quininæ and stimulants are thus essential. If the inflammation is local, a saline purge with poultices and fomentations fulfils all the necessities of the case.

HODGKIN'S DISEASE

Synonym, Lymphadenoma.

The affection now to be considered has been termed "Hodgkin's disease," because that physician first drew attention to the morbid processes in question as a separate form of disease. In later times it has been called malignant lymphoma, lympho-sarcoma, adenia, and pseudo-leukæmia. The disease has been confounded with leucocythæmia, but their clinical history differs, for in Hodgkin's disease there is no increase in the white corpuscles of the blood, and its course is comparatively rapid, lasting only from two to six months or a year.

The disease generally begins with a slight and painless swelling of the lymphatic glands of the neck, of one or both sides, and this swelling gradually increases until regular chains of swollen glands are formed from the angle of the jaw to the clavicle. Later on, the inguinal and axillary glands are attacked, and finally the whole lymphatic apparatus, including the spleen. Briefly stated, the nature of "Hodgkin's disease" may be said to be this: There is hyperplasia, increased cell-growth of the lymphatic glands. This increased cell-growth may be soft, and exude a milk-white juice on section, or it may be hard and dry, of a yellow colour, and almost fibrous in appearance. As the soft and hard forms are sometimes found in the same body, it has been inferred that the latter is only an advanced stage of the former. In a case which came under my observation in 1879, the disease was accompanied, and in fact ushered in, by profuse bleedings

from the nose, which recurred at intervals. There was latterly intense dyspnœa, probably through the enlargement of the bronchial glands compressing the bronchi. There was excessive palpitation of the heart on sitting up, also an anæmic murmur, and gradually increasing pallor. Diarrhœa came on towards the end, and the temperature, which had been below the normal standard, rose during the last few days to 102° F. The man finally sank into a comatose state, and died six months after admission to the hospital.

Treatment.—A series of cases lately recorded by Billroth indicates that the administration of arsenic in gradually-increasing doses was attended with beneficial results. Previous to this the disease had been considered hopeless.

DISEASES OF THE THYROID BODY

The thyroid body may be the seat of hypertrophy, atrophy, inflammation acute and chronic. The most common disease of the thyroid body is, however, Goître (*Synonym*, Bronchocele), which consists in a kind of hypertrophy of the normal constituents of the thyroid gland. Sometimes these are increased in equal, and at others in unequal proportions, and hence the character of the tumour becomes modified. If the connective tissue alone undergoes hypertrophy, the tumour is hard and firm; if the vascular tissue, the veins and arteries are greatly enlarged; if the vesicles, they become filled with fluid of a semi-gelatinous consistence. The size of the hypertrophy varies usually from mere fulness to that of a cocoa-nut, but at times it assumes such large dimensions as to form a tumour, which conceals the chest, and sometimes reaches over the greater portion of the abdomen.

It is peculiar to certain localities, and constitutes the goître of the Swiss and the Derbyshire Neck of England. It is also found in Nottinghamshire, Sussex, Yorkshire,

and seems in all cases to depend on the water supply being greatly impregnated with the sulphate and carbonate of lime, and with the addition also, according to Virchow, of some endemic malarial influence.

Symptoms.—The enlargement is characterised by no pain until it acquires a large size, or, from its development, presses upon important structures, as the large veins of the neck, or on the trunk of the sympathetic nerve, or on the pneumogastric and recurrent laryngeal, or on the brachial plexus. It may also compress the œsophagus and trachea, and give rise to a long train of evils, which accrue from obstructed respiration or impeded deglutition.

Treatment.—Departure from the district in which the goître has been contracted is an essential part of the treatment. Different air and water supply, with food rich in iodine, eggs, milk, fresh-water plants, and fermented liquors, may be sufficient to reduce the hypertrophy, and the climatic and dietetic treatment is also materially assisted by the use of preparations of iodine internally and externally; and chalybeate medicines.

DISEASES OF THE SUPRA-RENAL CAPSULES

The function of the supra-renal capsules is a subject of great interest and obscurity. Their purpose in the economy of nature is as yet undetermined. They seem, like the spleen, the thymus and the thyroid glands, to be in the healthy state essential to the proper elaboration of the blood; and to have as diseases hypertrophy, atrophy, and lardaceous disease. A peculiar disease connected with the supra-renal capsules is termed

ADDISON'S DISEASE

Synonym, Bronzed skin. Melasma Addisoni.

In investigating diseases of the spleen, the conviction seems to have grown on Dr. Addison that the supra-renal bodies were implicated, by observing that a peculiar form of anæmia with discoloration of the skin was not connected with disease of other organs usually associated with anæmia.[1] The symptoms observed by him were great and increasing debility, a feeble pulse, faintness on the slightest exertion, loss of appetite, pain most marked in the epigastrium, but also shooting through between the scapulæ, and progressive emaciation. With these general symptoms the skin became gradually discoloured, this discoloration being most marked in the face, neck, superior extremities, penis, scrotum, and round the navel. The skin in the regions mentioned, and also on the hands, assumed a dingy, smoky hue, which in advanced cases deepened into a "bronzed" colour. So marked was this in one case recorded by Dr. Addison, "that, but for the features, the patient might have been mistaken for a mulatto."

The course of Addison's disease is progressive, but its rate of progress is by no means uniform. Alternate exacerbations and remissions occur, and death may take place gradually, with weakness and coma, or unexpectedly, with diarrhœa and vomiting or with convulsions.

The duration of the disease is varied. Eighteen months may, however, be taken as an average.

The disease is more frequently seen in males than in females at the active period of adult life, and in those employed in manual labour. The nature of the change in the supra-renal body is *tubercular*. A firm gray or whitish mass is formed within the medullary substance, nodulated at its growing edge, and sometimes surrounded by clusters of miliary tubercle. Death rarely occurs at this stage, but later on, when the post-mortem shows

[1] Addison's disease is never limited to one supra-renal body.

extension of the gray material and destruction of the cortical substance within the organ. In most cases certain parts of the gray substance have undergone caseation, with rounded yellow nodules embedded in it, or, the conversion being complete, there is only a single large yellow mass. Or a further change may have taken place, with absorption, shrinking of the organ into a small mass, in which irregular nodules of calcareous matter are deposited. The semilunar ganglia and branches of the sympathetic nerve are involved by the degenerative process, and in some cases symptoms of Addison's disease have appeared to be caused by the affection of the ganglia independently of any primary change in the supra-renal bodies. The opinion has thus been entertained that the disease may originate from the semilunar ganglia. There is no satisfactory explanation of the peculiar pigmentation of the skin, the most probable supposition being that it is dependent on the implication of the nerve centres.

Treatment. — There is no proof of recovery having taken place in this disease, and the treatment must be symptomatic, the debility being combated by tonics and stimulants.

DISEASES OF THE KIDNEYS

Healthy urine on exposure to air undergoes a series of changes, which should be clearly understood. First there occurs a precipitation of the amorphous urates, then of uric acid, and sometimes oxalate of lime. After a variable period *acid fermentation* takes place, and this is probably due to the formation of lactic acid. In the course of four days the acidity becomes faint, and the urine loses its pleasant odour and enters into a state of *alkaline fermentation.* Its clearness departs and turbidity ensues owing to the development of micro-organisms. The amorphous urates deposit is replaced

by dark round masses of urate of ammonia, uric acid crystals give way to bright prisms of triple phosphate, and an abundant sediment of amorphous phosphate of lime sinks to the bottom of the vessel.

When the urine becomes fairly putrid the micro-organisms alluded to cease to grow.

We will, under certain headings, consider the urine in health and disease, and try to bring out the most important points to be ascertained from its examination.

1. *Quantity.*—The quantity of urine passed in twenty-four hours by an adult healthy man varies widely within normal limits, but is usually from forty-five to fifty fluid ounces. This quantity is increased in Diabetes Mellitus, Diabetes Insipidus, contracted kidney, amyloid degeneration of the kidney, in some forms of hysteria, and usually in convalescence from acute diseases. It is diminished in acute nephritis, in all diseases which are attended with the abstraction of water from the system, such as cholera, dysentery, gastric and intestinal catarrh ; this diminution is a notable feature in uræmia.

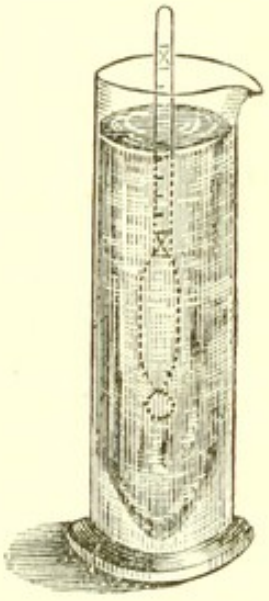


Fig. 16.

2. *Density of the Urine.*—The specific gravity of healthy urine is from 1·015 to 1·025, and this specific gravity is estimated by the *urinometer*. This instrument has a bulb and graduated stem ; if the bulb be placed in distilled water at 60° F. it floats at the zero point of the index, in normal urine, somewhere between the figures previously mentioned.

As a general rule in disease it may be stated that when the quantity of urine is diminished its sp. gr. is raised, and an abnormal sp. gr. in the course of any disease is a fact of great importance. In failure of the kidneys to eliminate the products of tissue waste a fall of the sp. gr. is observed, which may for several days precede the access of uræmic convulsions ; and a rapid decline, in the course of continued fever, sometimes precedes a fatal

termination; again, if on the first examination of urine we find the sp. gr. below 1·015 we may suspect albumen, if above 1·025 there is possibly sugar.

3. *The Colour and Odour of the Urine.*—Healthy urine has a pale yellow, amber, or straw colour, and a faint and peculiar odour due to the presence of certain volatile organic acids. The normal urinary pigments have as yet not been completely separated, but it is probable that they are several in number. The colour of healthy urine depends partly upon the degree of concentration, being darker as this is more pronounced.

In fever, additional colouring matter is secreted, the nature of which is at present unknown. At some period in the course of a disease the colour of the urine may undergo a change from the admixture of blood; if this be in a small quantity a flesh colour is observed, if large it may be bright ruby-red, and in most cases it has a smoky or muddy look. Bile pigments impart a brownish-yellow or green tint, and the presence of bile may be usually detected by shaking up the urine, when a yellow foam will form upon it. Urine which contains much urobilin is always of a dark red-brown colour, and when shaken up will yield a similar foam.

Certain drugs when taken affect the colour of urine—rhubarb and senna give a brown or blood-red; carbolic acid imparts a dark colour, if the urine be allowed to settle for a time; quinine and antipyrin also colour it more or less deeply. It may be stated in general that the urine is darkly coloured in fevers, and in congestion of the kidneys, from heart disease, emphysema, and chronic bronchitis. In cancer, affecting the intestinal canal, it is apt to be dark and pigmented, and in such a case an excess of indican may be determined.

On the other hand, it is deficient in colouring matter in Diabetes Mellitus and Insipidus, chronic nephritis, hysteria, and anæmia.

4. *The Reaction of the Urine.*—Healthy urine is as a rule acid, and this acidity depends mainly on the acid salts (chiefly acid phosphate of sodium) which it contains.

The acidity is generally less marked in the forenoon than at any other time, and the urine of a healthy person may at the former period exhibit an alkaline reaction.

Diet modifies the reaction, for it may be alkaline after a full meal, or after taking alkalies or the salts of the alkalies with the organic acids, the latter being converted into carbonates in the system. On the other hand, the administration of acids renders the acidity of the urine more marked in some cases. Healthy urine allowed to stand for a few days becomes alkaline in consequence of the action of a micro-organism—the micrococcus ureæ—which is supposed to form carbonate of ammonium by the combination of the urea with water, thus—

$$CO(NH_2)_2 + 2\ H_2O = (NH_4)_2CO_3.$$

It also becomes cloudy and emits an offensive and characteristic odour. The urine is as a rule acid in febrile conditions, diabetes, abnormally so in leukæmia and scurvy; on the other hand, it is alkaline in cystitis, in simple and pernicious anæmia, and in chlorosis.

In 1000 parts urine we have—

	Water	954·81
	Solid matters	45·19
Solids—		
	Urea	21·57
	Uric acid	0·36
Extractives.	Kreatin, kreatinin, ammonia, hippuric acid, xanthin, hypoxanthin, sarcina, pigment, unoxidised sulphur and phosphorus, mucus, etc.	6·47
	Chlorine	4·57
	Sulphuric acid	1·31
	Phosphoric acid	2·09
	Potash	1·40
	Soda	7·19
	Lime	0·11
	Magnesia	0·12

The *normal constituents* of the urine to which for practical purposes attention must be directed are, among *organic* substances, urea, uric acid, hippuric acid, kreatinin, xanthin, oxalic acid, and the colouring matters urobilin and indican. Among *inorganic* substances, phosphates, chlorides, sulphates.

Urea.—By far the greater part of the nitrogen taken with the food is eliminated as urea. It may be con-

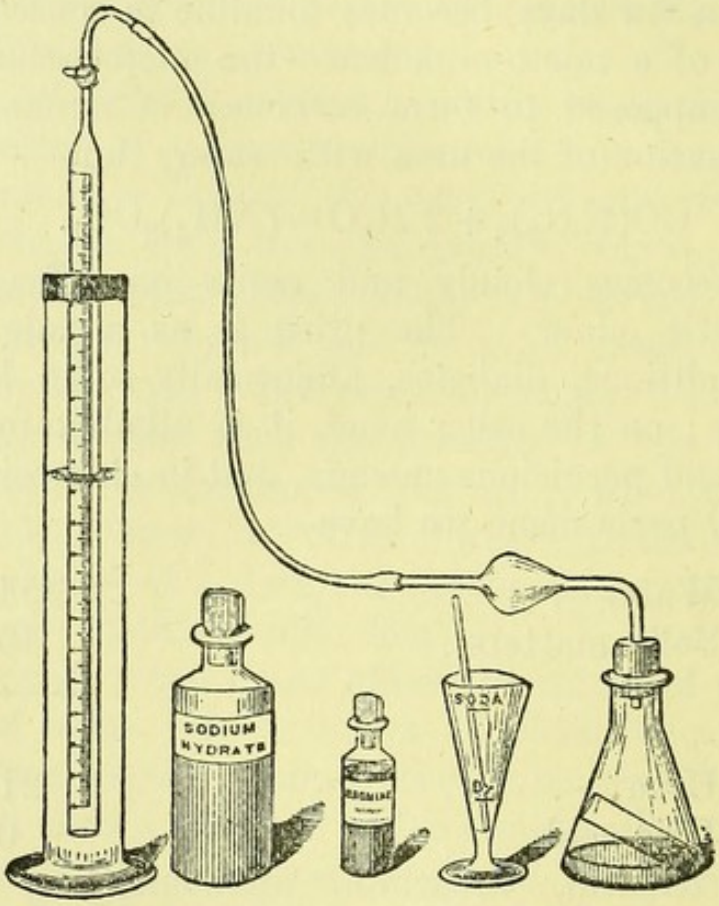


Fig. 17.

sidered to be the result of the metamorphosis of the nitrogenous elements of the food and tissues. Of this body 400 to 450 grains—about 8 grs. to the ounce of urine—are daily excreted by a healthy man (*i.e.* about $3\frac{1}{2}$ grains per pound of body weight), but its quantity varies greatly under physiological and, still more, under morbid conditions. This quantity can be accurately determined by the ureameter (Fig. 17), and the method of doing this is described in the appendix, p. 650.

The ureameter is easily worked. It gives perfectly accurate results, and careful daily testing can be recorded by an experienced nurse. Further, its use aids treatment; for in chronic Bright's disease a marked deficiency foretells uræmia, and this may be averted by pilocarpine and active cathartics. The quantity passed is increased in diabetes and in fever, notably in acute rheumatism, when the normal quantity is nearly doubled, 16 grains per ounce being a not uncommon proportion. On the other hand, it is diminished in chronic diseases attended by mal-nutrition and in diseases involving the proper structure of the liver, where it is elaborated. In continued fever and in the late stages of phthisis the amount of urea eliminated is of diagnostic importance, for an increased quantity in fever is a good omen, while in the late stages of phthisis a decreasing quantity indicates the advent of a fatal result.

Mode of Detection.—The presence of urea in the urine can always be shown by evaporating the urine, if of ordinary sp. gr., to about half its bulk and adding an equal quantity of nitric acid. On cooling the mixture, shining rhombic crystals of the nitrate of urea are seen through the fluid. If the urine be of high sp. gr. it is often unnecessary to concentrate it by evaporation previous to the addition of nitric acid.

Uric Acid.—In highly acid urine a crystalline deposit of uric acid may spontaneously appear, but this is rare, and for the purpose of examination it should be secured by the addition of strong hydrochloric acid to urine. This throws it out of its combination with bases, and it is then, owing to its insolubility, precipitated. When examined under the microscope it presents many different forms, but they are usually readily recognised by their red or orange colour.

The Uric Acid Diathesis.—A healthy adult excretes about $7\frac{1}{2}$ grains of uric acid with the urine in twenty-four hours. This quantity is increased in health by an excess of animal food, and the urates appear as a red deposit in the vessel when the urine cools. In fever,

leukæmia, pernicious anæmia, and in diseases of the heart and lungs with obstructed respiration, the quantity exceeds the normal standard.

The excretion of uric acid, on the contrary, is diminished in nephritis, gout (after the acute paroxysm), diabetes, and chronic rheumatism.

In certain cases with few symptoms except emaciation a remarkable increase of uric acid is the only real objective manifestation, and such cases undoubtedly constitute what is termed the *uric acid diathesis*.

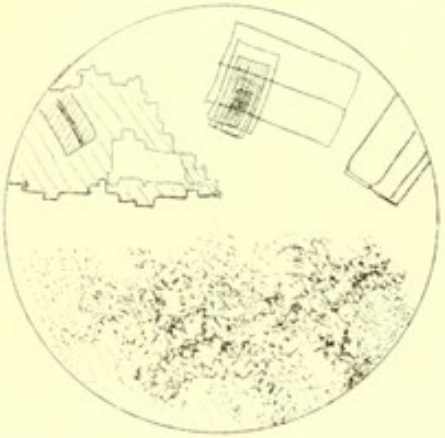
Treatment.—In the slighter forms an antibilious pill, regulation of the diet, and the use of Vichy or Contrexéville water will act as efficient remedies. In chronic gout or chronic rheumatism it is necessary to use more potent means to aid their elimination, as ℞ vini colchici ʒiv, potassii chloratis ʒiii, tincturæ serpentariæ ʒiii, decocti scoparii, decocti senegæ āā ʒvi. M. Sig. ʒi every four hours.

Urates.—Uric acid forms salts with metals of the alkalies and alkaline earths, but the only urates commonly met with among the products of renal activity are those of sodium and ammonium. Deposits of urates are found in two forms, amorphous and crystalline.

Amorphous Urates.—These form a finely granular deposit of a variable colour—cream, fawn, orange, red, or pink. Along with the sediment at the bottom of the glass, a FINE FILM is seen upon the sides, which film is characteristic, and distinguishes urates from all other deposits. They are further easily recognised by the application of heat, for they then completely dissolve, and the urine is left clear. They are the *only urinary deposits* which *disappear* by the *heat test*. *Microscopically* amorphous urates are seen as a mass of granules, large or small, and *chemically* they consist of uric acid in combination with several bases — sodium, ammonium, potassium, and calcium. The deposit of urates has no special significance, for they are frequently formed in cold weather, and as the result of errors of diet.

Crystalline Urates.—These deposits are composed of

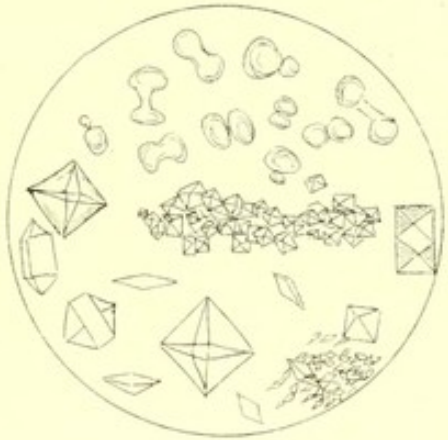
CRYSTALLINE AND AMORPHOUS URINARY DEPOSITS.



CHOLESTERINE
AMORPHOUS URATES



URATES OF SODA
URATES OF AMMONIA



OXALATES OF LIME



CYSTINE
TYROSINE



URIC ACID



URIC ACID



TRIPLE PHOSPHATES



TRIPLE PHOSPHATES

urate of sodium and urate of ammonium. When present the crystalline urate of sodium (a grayish or yellowish deposit) points to the urine being very acid, and it is associated with gouty conditions and the fever of childhood. The urate of ammonium precipitate is invariably white in colour, and it is always accompanied by phosphates. It has no diagnostic importance.

Hippuric Acid.—The amount of this acid, chiefly in the form of the sodium salt, in the urine of twenty-four hours, is from 12 to 15 grains. It is a crystalline substance, and under the microscope is seen to consist of rhombic prisms. It is increased in health by a vegetable diet, and in disease by febrile conditions and Diabetes Mellitus.

The *inorganic substances* to which it is necessary to call attention are phosphates, chlorides, and sulphates.

Phosphates.—Two kinds of phosphates are found in urine when it has become alkaline: (1*st*) amorphous phosphate of lime, (2*d*) ammonio-magnesian or triple phosphate. These are always deposited when, through fermentation, the urine becomes alkaline. The phosphate of lime is observed as an amorphous deposit under the microscope, and the triple phosphate occurs in rhombic prisms. A third variety of phosphates is observed in the stellar phosphate of lime. They are rarely seen, and may for all practical purposes be considered simply as clinical curiosities, if only a few are observed; but if in quantity and continued for some days, Dr. Roberts deems them of grave import.

Occasionally from diminished acidity of the urine, due to want of exercise or excess of mental effort, the urine is feebly acid or nearly alkaline when voided; and such urine may be turbid from phosphates even when passed. This need give rise to no anxiety. Exercise and a mineral acid with a vegetable tonic, and cessation from work, will soon restore the normal acidity to the urine, and dispel the phosphates.

The quantity of phosphates is, however, increased in febrile disorders and in diseases of the nerves and bones;

while it is decreased in Bright's disease and in fevers after the disappearance of the febrile symptoms.

The deceptive cloud of phosphates sometimes occurring on boiling urine is removed (as stated at p. 370) by adding to the boiling solution a drop or two of nitric acid, which at once clears up the urine. Boiling without the acid will not, however, do so.

Chlorides.—Chlorine is *present* in the urine in combination with ammonia, fixed alkalies, or alkaline earths. The quantity chiefly depends on the amount of salt taken with the food. Chlorides are easily detected by adding a solution of nitrate of silver and a drop of nitric acid to urine in a test-tube, when a curdy precipitate is formed. Their *absence* from the urine is of clinical significance, as in the acute stage of pneumonia.

Sulphates.—Sulphur appears in the urine, as

1. Sulphuric acid free, or in conjunction with organic radicals, or with inorganic bases ;
2. Oxidisable sulphur compounds, as taurine ;
3. Sulphur compounds oxidisable with difficulty.

For details as to the mode of detecting them the student is referred to text-books of chemistry.

Clinically the estimation of the sulphates is of importance in diagnosing the condition of the liver. The more sulphur is excreted by the bile, the less appears in the urine, and *vice versâ*.

Kreatinin.—This is a crystalline base which forms highly characteristic compounds with acids. It is recognised by its oblique rhombic prisms, and the quantity of it present in the urine of twenty-four hours is from 7 to 15 grains. The quantity present is in direct relation to the amount of flesh meat consumed in food, and under certain circumstances to the muscle waste in the body. An increase is noted in acute diseases of all kinds attended with fever, and in Diabetes Mellitus ; and a diminution is observed in chronic Bright's disease, Diabetes Insipidus, and in convalescence after acute diseases. *Xanthin* and other extractives mentioned as occurring in healthy urine have no special significance.

Oxalic Acid.—This acid occurs in healthy urine passed in twenty-four hours, to the extent of 0·02 grammes. An excess of oxalic acid is occasionally found in diabetes, and especially when the quantity of sugar diminishes. While our knowledge of this condition is very defective, yet there are certain complaints, characterised by pain in the back and loins, and attended with great emaciation, in which the only other objective symptom is an excessive elimination of oxalic acid in the urine. It may then be termed *oxaluria*; but the occasional occurrence of oxalic acid in the urine above the normal quantity need give rise to no anxiety, as its presence is then due to errors of diet, and yields readily to treatment by nitro-hydrochloric acid.

Pigments.—Of the normal organic constituents of the urine, the colouring matters urobilin and indican alone require a brief notice.

Urobilin is constantly present in healthy urine. When separated from urine, urobilin is a dark reddish-brown powder, readily soluble in alcohol, ether, and chloroform, but less easily dissolved in water. It is diminished in quantity in chronic Bright's disease, and increased in fever and some derangements of the digestion.

Indican as such is rarely present in the urine, but it may always be obtained from it as a product of the decomposition of salts of indoxyl-sulphuric acid. It can be detected by mixing the urine with its own bulk of hydrochloric acid, and adding drop by drop a solution of calcium chloride, until a greenish tint is produced. The indoxyl-sulphates are thus split up, and the coloured product indigo blue remains, which can be removed by shaking up with 10 centimetres of chloroform, and the colouring matter is obtained as a deposit after evaporation. There are certain diseases in which indoxyl-sulphuric acid is regularly produced in excess; and the presence of indican in the urine is very often a sign of intestinal putrefaction, and it may also accompany the decomposition of albumen in other cavities. Thus in cases of pleurisy with a large unhealthy exudation there is an

excess of indican in the urine, and when this abundance arises in the course of peritonitis it may be taken as an evidence of the character of the disease and of the formation of unhealthy pus.

In the light of the foregoing statements, and from those which follow, a student in a clinical ward, and undergoing the ordeal of a clinical examination, should proceed in a systematic manner to examine a sample of urine placed before him, and should note the results in a tabular form on paper :—

1. The colour of the urine.
2. Test its reaction by litmus paper.
3. Indicate its specific gravity by reading off the number obtained by placing the urinometer in the sample with the bulb downwards.
4. If the specific gravity be lower than normal—1017, test for albumen by heat and nitric acid, remembering certain precautions in doing this ; if higher than the normal—1025, test for sugar with Fehling's solution.
5. Place a sample of any deposit in the urine glass under the microscope, and describe whether it is crystalline, amorphous, or composed of tube casts, blood, or pus.
6. Then indicate, so far as this examination goes, the probable nature of the disease.

The *abnormal substances* which may be present in the urine are many, but for practical purposes it is only advisable to treat of proteids, blood, bile, sugar, acetone, organised deposits, epithelial mucus, and pus cells, casts of the renal tubules, and certain crystalline matters, as leucin, tyrosin, cholesterin, and cystin.

The proteids most commonly found in urine are serum albumin, serum globulin, peptones and albumoses, the latter proteids (peptones and albumoses) being intermediate products formed during the process of digestion. All the proteid bodies are precipitated by a number of reagents, and the presence of such substances is consequently determined. The exact determination of one or all requires further examination by appropriate tests which will be afterwards mentioned.

Albumen.—We shall commence with the consideration of serum albumen, which is the commonest of the morbid constituents of the urine, and we shall premise our observations by stating that serum albumen and serum globulin are usually associated together.

It is still an open question whether, apart from diseased conditions, albumen is ever detected in a considerable quantity in urine. With regard to this, opposite opinions are held; yet while giving due credence to the negative and affirmative side, we may confidently state that the urine occasionally holds a variable quantity of albumen as a temporary constituent, whilst at the same time the kidneys exhibit no structural derangements. In such its presence may be due to a sudden disturbance of the circulation.

For a long time it was thought sufficient merely to determine the presence of a proteid matter in urine, and the further question was not raised as to whether it occurred in more forms than one. It is now however established, apart from physiological grounds, that in addition to serum albumen and serum globulin the urine may contain peptone and albumose.

It is to be remembered that serum albumen in notable quantity is never found in healthy urine. Its appearance in all cases is a morbid symptom of great importance. The albumen of urine may be derived from the kidneys, in which case it is termed renal albuminuria, or by admixture from parts in the urinary passages beyond the kidney, when it is designated accidental albuminuria.

(*a*) *Renal Albuminuria.*—This form of albuminuria is dependent, in the great majority of cases, on inflammatory and degenerative changes in the structure of the kidneys. But we cannot infer from the quantity of albumen present the extent and severity of these changes. Great and grave changes in the kidney (as in the granular kidney) have occurred, yet the urine may only contain traces of albumen. Again, without structural disease of the kidneys, albumen may be detected from disturbances of the circulation, provided such disturbances extend to

the vessels of the kidney. In fever, the changes in the blood pressure are sufficient to cause the appearance of albumen in the urine, and so also may an altered condition of the blood in anæmic and enfeebled individuals independently of kidney disease.

It must therefore be borne in mind that we are never warranted in inferring the existence of a renal affection from the mere fact that the urine contains albumen. This, the error of former times, has been dissipated by the clinical evidence of the present.

(*b*) *Accidental Albuminuria.*—The albumen detected in the urine from a source other than the kidney may come from the renal pelvis, the ureters, the bladder, the urethra, or the vagina. We are warranted in such cases in considering the albumen to be accidental if we fail to detect under the microscope renal casts and round epithelial cells, and if other signs of renal dropsy are wanting.

Determination of Albumen.—There are many tests for this purpose, all no doubt valuable, but we shall select those which we consider to be the most reliable and the most easily applicable. We must premise by stating that on testing for albumen or other proteids the urine should be filtered if turbid. If very highly acid it should be rendered less so by liquor potassæ. If alkaline it should be made slightly acid by means of acetic acid.

1. *Nitric Acid and Heat Test.*—A portion of urine is placed in a test tube and boiled. Should a precipitate form on boiling, this may consist either of phosphates or albumen. A drop or two of nitric acid settles this question, for if the precipitate dissolves on this addition it is composed of phosphates, if not dissolved in presence of the acid, but increased thereby, it is albumen.

2. *Nitric Acid alone in the Cold.*—Thirty drops of strong nitric acid are placed in a test tube, and the urine is slowly floated over this, or the urine may be placed in the tube and the acid gently poured down the side so as to lie below it. A cloud of coagulation immediately above the junction shows that albumen is present.

The latter is called the contact method, and on it is

based the action of other reagents employed for detecting albumen, which we shall now mention.

3. *The Brine Test (Roberts's).*—The reagent is made by adding 60 minims of strong hydrochloric acid to a pint of water and saturating the solution with common salt. It is employed in the same way as the nitric acid in the contact method, *i.e.* by slowly pouring the solution down the side of the tube containing about a drachm of the urine, until it underlies it. A cloud of coagulation above the junction indicates the presence of some proteid.

4. *The Potassium Ferrocyanide Test (Pavy's).*—This test is conducted by acidulating the urine with acetic acid and adding a 1 to 12 solution of ferrocyanide of potassium; if albumen be present it is precipitated.

5. *The Picric Acid Test (Johnson's).*—A saturated solution of picric acid, which has a low sp. gr., is floated upon the surface of the urine, and the tube is gently shaken in order to cause a slight mixture of the reagent with the urine. Cloudiness of the zone where the two fluids are mixed shows that one or other of the four proteids mentioned is present, unless the individual whose urine is under examination has been taking quinine or other alkaloid which produces a substance coagulable by picric acid.

6. *Biuret Test.*—The urine is treated with caustic potash, and a dilute solution of sulphate of copper is added, drop by drop, with a pipette. If albumen be present the resulting peroxide of copper (a green precipitate) is dissolved, and the fluid assumes a reddish violet colour.

This test serves for albumen, albumose, globulin, and peptone. The latter substance, however, strikes *red*, not *violet* in the fluid.

In considering the tests mentioned preference must be given to the heat and nitric acid tests. They are familiar to every one who has had hospital experience. A few errors connected with their use will be subsequently mentioned, but undoubtedly, if these be borne in mind, the two tests in question will discover any appreciable quantity of albumen, and form the basis for a safe and

accurate diagnosis of diseased conditions. They are not like the other tests—so fine as to lead to error between mucus and albumen, and to create alarm when this is uncalled for.

Next to these tests is picric acid. It is a delicate test, but its very delicacy may cause misapprehension, for its use detects what may be termed physiological albuminuria occurring occasionally in health from errors of diet or exercise. This physiological albuminuria may not be detected by nitric acid or heat, and it is a phenomenon which need give rise to no alarm on the part of the physician or the patient. At the same time, the delicacy of the picric acid test makes its employment advantageous in testing the urine of a patient recovering from scarlet fever, where the earliest appearance of albumen in the urine should be carefully watched, and, if detected, checked by appropriate means. Here the picric acid test should not be relied upon alone, but should be confirmed or discredited by the test of nitric acid and heat.

Errors in detecting Albumen.—We will notice under this head certain errors which may occur in testing for albumen: (1) by heat; (2) by nitric acid; (3) by picric acid.

1. If heat be alone relied upon, it may mislead in two opposite directions. First, by not detecting albumen if the urine be alkaline; hence the necessity of testing the reaction by litmus paper. If the urine be alkaline, acidify with a drop or two of acetic or nitric acid. Secondly, by giving a delusive cloudiness in non-albuminous urine; a drop or two of nitric acid would increase the clouding from albumen, while on the other hand it clears it away if it depends upon phosphates.

2. A single drop of nitric acid will, in highly albuminous urine, form a white clot or coagulum. This is redissolved by shaking the tube.

3. Urine loaded with urates presents a turbid appearance on cooling. A drop or two of nitric acid in such cases does not clear away the urates, and albumen may be falsely diagnosed as being present. This error is

guarded against by first applying heat when the urates disappear, and an albuminous precipitate is formed, which the subsequent addition of nitric acid fails to dissolve.

4. It sometimes happens when nitric acid is added to clear yet highly acid urine recently passed that it causes turbidity from the deposition of urates. This, however, disappears on heating, while heat has no effect on the albuminous precipitate, unless boiling be prolonged.

5. The cloudiness of the zone obtained when the picric acid solution is added to urine indicates the presence of one of the four proteids. It is to be remembered, however, that picric acid added to the urine of a person who has been taking quinine or other alkaloid will also produce a coagulation which may not be due to albumen.

Quantitative Estimation of Albumen.—The quantitative estimation of albumen is not yet placed on a very distinct or easily applied basis. It may, however, be approximately determined thus: bring a measured quantity of albuminous urine to a slightly acid condition, boil, place the precipitate on a weighed filter, wash, dry at 212° F., weigh; or for practical clinical purposes boil a certain quantity of urine in a test tube previously acidulated with a drop or two of *acetic acid*. The albumen coagulates, forms flakes, and sinks to the bottom of the tube. The proportion of the albuminous deposit to the amount of urine left uncoagulated in the test tube is represented in numbers, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{12}$, and so on.

If the amount of albumen be too small to cause any appreciable deposit, this condition is noted by simply stating that after the application of tests for its detection it was "cloudy" or "opalescent."

Peptones.—If by the Biuret test we find that a *red*, not a violet colour is produced, we may proceed to test for peptones in the manner described in the appendix. So far as our present knowledge goes, the presence of peptones or the condition termed *peptonuria*, and the causes which produce it, are quite different from those to which the other forms of albuminuria are due. It is not associated with nephritis, circulatory disturbances, or anæmia. The

presence of peptone in the urine is most commonly connected with such processes as are characterised by the collection and subsequent destruction of leucocytes, under such circumstances that the products of disintegration (including the peptone constituent) can obtain admission into the blood stream, to be subsequently eliminated by the urine. To the condition arising in this way the term "Pyogenic peptonuria" has been applied by Hoffmeister. It occurs chiefly in the resolution stage of pneumonia, in purulent pleuritic exudations, and in general in suppuration, wherever situated, provided that the conditions are favourable to the absorption of the constituents (peptone) of the pus. Peptone has thus been found in the urine in purulent meningitis, the suppuration of phthisis, after the injection of Koch's lymph, and in all those states which are attended with the formation and breaking down of pus.

It is therefore a valuable diagnostic test, not merely in detecting suppuration as in purulent pleuritic effusions, but also by confirming other evidence of the progress and resolution of pneumonia.

Albumose.—Albumose is a pro-peptone, and according to recent research it is really a mixture of four different proteids. It has been found in the urine in osteo-malacia, dermatitis, and intestinal ulcer. The clinical significance of this condition is in general very indefinite, and as it does not lend itself very surely to the aid of diagnosis, its detection does not appear to require special notice.

Globulin probably never, or almost never, occurs alone in the urine, but generally in conjunction with serum albumen. Consequently its import in disease is the same as that of the former body.

Glucose or Grape Sugar.—There are several tests by which glucose or grape sugar can be detected in the urine, but the tests which are really used in hospital and private practice are not very numerous. The principal one is the copper test. This test is based upon the fact that grape sugar or glucose—the form of sugar that is contained in the urine in diabetes—possesses the property of reducing the hydrated oxide of copper to a sub-oxide

at a temperature of 212°. The hydrated oxide of copper is *blue*, and liquids containing it in solution have a deep blue colour. On the other hand, the sub-oxide is *orange-yellow*, so that there is no difficulty in seeing whether or not reduction takes place. Now, if the specific gravity of any urine is 1030 or more, it indicates that glucose is probably present, and this probability is almost a certainty if the urine be pale in colour and excessive in quantity.

Trommer's Test.—The urine is rendered alkaline with liquor potassæ, and a fairly strong solution of sulphate of copper is added, drop by drop, until the oxide of copper formed ceases to be dissolved. The mixture is then heated in a test tube. If sugar be present in greater quantity than a mere trace, a yellowish or red precipitate of the sub-oxide of copper FALLS BEFORE THE BOILING POINT is reached, and at the same time the fluid somewhat loses colour.

This test is ordinarily carried out by adding to a drachm of urine placed in a test tube a drop or two of a dilute copper solution and about half a drachm of liquor potassæ. When heat is applied, unless sugar is present in a large amount, the reaction obtained more closely resembles Moore's, than the characteristic copper reduction test.

Fehling's Test.—This is a modification of Trommer's test, but more delicate and accurate. Fehling's solution consists of sulphate of copper, tartrate of potassium, and caustic soda (F. 93). It should be freshly prepared, but if there be any doubt about this, fill a test tube to the depth of an inch with the solution, boil the latter, and set it aside to cool. If no deposit occurs, the solution may be relied upon. Heat it again to the boiling point, and add a drop of the suspected urine; if sugar be present, a yellow precipitate is quickly formed, which turns red on longer boiling or standing aside. If the sugar is small in amount, more urine must be added.[1]

[1] "It is known that many other organic substances besides sugar are capable of reducing the oxide of copper, but none of these are ever present in the urine, with the exception of kreatinin, leucin, uric acid, or chloroform, and of these, uric acid alone could be sup-

Indigo-Carmine Test.—Dr. Oliver of Harrogate has brought this test before the profession. Test papers are dipped in a solution of indigo-carmine. One of these is placed in distilled water in a test tube and boiled till a blue solution is formed, when the colourless test paper may be removed. A drop of the suspected urine is then added, and the liquid is boiled again for a few seconds. Then the tube should be raised an inch or two above the flame and held without shaking, while the solution is kept quite hot, but without boiling, for exactly one minute by the watch. If glucose be present in abnormal amount, the soft, rich blue will first of all be seen to darken into violet; then, according to the quantity of sugar, there will appear in succession purple, red, reddish-yellow, and finally a straw colour. After cooling and exposure to the air, the liquid passes back through the various colours to the original blue. So far as accuracy and delicacy are concerned, the copper tests mentioned fulfil all practical requirements with regard to the detection of sugar in urine. Yet corroborative or negative evidence of the presence or absence of sugar is afforded by :—

(*a*) *Moore's Test.*—This consists in boiling one or two drachms of urine in a test tube with half its bulk of liquor potassæ. If the boiling be kept up for some time, and if sugar be present, the urine passes through a series of colours which are almost exactly like those of different kinds of sherry, and finally becomes brown or even black. When this process yields a negative result, it may generally be depended upon.

(*b*) *Fermentation Test.*—A small quantity of yeast is placed in a test tube with a portion of the urine. The tube is inverted on a saucer, also containing some of the urine, and kept in position by a clamp, and placed at the side of a fire or in a warm place having a temperature of 80° F. If sugar is contained in the urine, this is decom-

posed to be likely to occasion a fallacy in the detection of diabetes. It is certain, however, that urine containing an excess of uric acid does not generally give rise to a change in the copper solution at all resembling that which would be produced by sugar."

posed into alcohol and carbonic acid. In a few hours it will be found that the liquid has receded from the upper part of the tube, in consequence of the accumulation there of the carbonic acid gas.

(*c*) *Picric Acid Test.*—Dr. G. Johnson employs a saturated solution of picric acid with liquor potassæ. When these are boiled with urine containing sugar, a dark claret-red colour from picramate of potassium is developed, the intensity of which is proportionate to the amount of sugar.

Quantitative Analysis.—The easiest way to perform this is based upon the fermentation test. It is proceeded with thus:—Collect the total quantity of urine passed in twenty-four hours. Place four ounces of this in an eight-ounce bottle with a small piece of German yeast, and four ounces in a similar bottle without any yeast. Lay the bottles corked aside in a warm place at a temperature of 80° F. for twenty-four hours. Then take the sp. gr. of the fermented and unfermented urine. It will be found that the fermented urine has a lower sp. gr. than the unfermented, and Sir W. Roberts has ascertained after careful experiments that for each grain of sugar per fluid ounce, one degree of density is lost by the process of fermentation. Thus—

Fermented specimen = 1010
Unfermented specimen = 1040

Loss—30, *i.e.* 30 grains of sugar per ounce.

This quantity, 30 grains, multiplied by the number of ounces of urine passed in twenty-four hours, will give the amount of sugar excreted by the system in that period. Thus if 100 ounces of urine are passed, $100 \times 30 = 3000$ grains of sugar excreted.

The performance of this method requires no technical skill, and it gives fairly accurate results. The objection to it is the delay, the result being obtained only after the lapse of twenty-four hours. More accurate and speedy determination of the quantity of sugar present is obtained

by Fehling's solution, of which 10 cubic centimetres are equivalent to 0·05 of a gramme of sugar.

For this method a graduated burette and stand are required. The process is conducted thus:—Take 10 cubic centimetres of Fehling's solution, diluted with 40 cubic centimetres of distilled water, and boil. Place 8 cubic centimetres of urine diluted 10 times with water in the burette, and from this drop half a centimetre into the hot Fehling's solution. A yellow or red precipitate will fall at once to the bottom. After it has subsided add another half centimetre, and so on until all the blue colour has disappeared. It is essential to note the exact moment of its disappearance. If 20 cubic centimetres of diluted urine be required to decolorise all the diluted Fehling's solution which, as above mentioned, is equivalent to 0·05 gramme of glucose, the 20 cubic centimetres contain exactly this amount. From this it is easy to calculate the percentage as follows:—

$$20 : 100 :: 0{\cdot}05 : 0{\cdot}25$$

The diluted urine thus contains 0·25 per cent, and the urine will contain 2·5 per cent of glucose.

Acetone.—Normal urine contains traces of acetone, but this body occurs in excessive proportion under certain morbid conditions, viz. febrile, diabetic, or in cerebral irritation or depression. The most common of these three forms is febrile acetonuria. It does not belong especially to any particular fever. In diabetes it indicates an advanced stage of the disease, and in the mental states mentioned it is found in connection with grave symptoms. Recent researches moreover show that an abundance of nitrogenous food tends to the production of acetonuria.

Detection of Acetone.—A quantity of the urine is treated with a few drops of a freshly-made concentrated solution of sodium nitro-prusside, and with a moderately strong solution of caustic soda or potash. This fluid develops a red colour which rapidly disappears, and, if acetone be present, gives place to purple or violet-red on the addition of a little acetic acid. The non-formation

of this colour on the addition of acetic acid shows the absence of acetone.

Blood in the urine to the amount of one part in two thousand gives it a smoky tint, and one in five hundred produces a bright cherry colour. All urine containing blood is more or less albuminous, and gives characteristic reactions with the tests for albumen.

Chemical Examination.—The most satisfactory chemical test is the tincture of guaiacum, which must be freshly prepared with rectified spirit. A small quantity of urine is placed in a test tube, and to this is added a drop of the tincture and as much ozonic ether as will equal the quantity of urine present, gently shaking the mixture. If blood be present, a bright blue colour is seen in the ozonic ether when it separates, or it appears at the junction of the fluids.

Heller's Test.—The urine is treated with a solution of caustic potash and boiled. The (basic) earthy phosphates are thus precipitated, and together with them the hæmatin derived from the oxyhæmoglobin present. The phosphatic sediment is consequently coloured a bright red.

The existence of hæmoglobinuria may be inferred when it is made evident by Heller's test that the urine contains blood-colouring matter, while at the same time the microscope discloses smaller or larger masses of brown pigment, and either no red corpuscles or so few as are inadequate to account for the results obtained.

Test for bile Acids in the Urine.—Pettenkoffer's test, modified by Francis and described by Ralfe, is the best for this purpose. Sulpho-saccharic acid is the agent used. It is made by drying 30 grains of glucose over a water-bath, and dropping it when cold into half an ounce of strong sulphuric acid. If the glucose be quite dry it does not become charred, but a straw-coloured liquid results, which keeps for some days if closely stoppered and placed in the dark. A test tube is filled to the height of half an inch with this reagent, and the urine is floated upon the surface; a beautiful purple colour at the line of junction is characteristic of bile acids.

Test for bile Pigments in the Urine (*Gmelin's Test*).—A few drops of urine are placed on a white porcelain plate, and near to this a few drops of strong nitric acid. The two fluids are to be gently brought into contact, when a play of colours is observed if the bile pigments be present, viz. green, blue, violet-red, and lastly, yellowish-brown.

Certain crystalline substances require to be noticed amongst the abnormal constituents of the urine.

Leucin and *tyrosin*, when present in the urine, always occur together. Their presence is characteristic of destruction of the hepatic cells, and they are most commonly found in acute yellow atrophy of the liver, as well as in various hepatic disorders, phosphorous poisoning, and some malignant forms of fever.

Cystin is an uncommon urinary deposit. It occurs in some affections of the liver, and has been found in anæmic and tubercular conditions.

Cholesterin occurs in the form of rhombic plates, often with notches at their angles. It is usually regarded as the result of the absorption of purulent matter.

Substances derived from the Genito-Urinary Tract.—Epithelial cells and mucus are normally present in the urine, but pus is an abnormal constituent. It is better to consider the normal and abnormal constituents under this head together.

Mucus.—Mucus in varying quantity is present in all urines, and the light transparent cloud of mucus consists of mucous corpuscles and nucleated epithelial cells. Mucus is not precipitated by heat, but with acetic acid it produces a stringy deposit, and picric acid coagulates it.

Microscopical Examination of the Urine.—When first passed healthy urine is generally quite clear, but on standing it usually deposits a filmy cloud. Microscopically this deposit is seen to consist of a few crystals of various kinds, some white blood corpuscles, and epithelial debris. The examination of morbid urine by the microscope affords important information in diagnosis.

It may be thus proceeded with : The urine is allowed to settle, the clear supernatant fluid poured off, and some of the sediment placed in a conical vessel, where it is again allowed for a while to settle ; a little of it is then removed with a pipette and placed on a slide for examination. If the sediment should be scanty and require, say, twenty-four hours to deposit, it should be set apart in a cool place, so as to check any fermentative processes which might alter the character of the specimen. Still further to check the fermentation, 20 to 30 cc. of a fluid containing 5 to 7·5 cc. of chloroform in a litre of water should be added to it.

Epithelial Cells are of various kinds, the most important being the squamous, columnar, and round forms.

Squamous Epithelial Cells are derived from the bladder or vagina. They are large in size, irregularly circular in outline, presenting distinct nuclei.

Columnar Epithelial Cells have their origin in the urethra, ureter, or pelvis of the kidney. They present cylindrical or pyramidal outlines, and their form gives an indication of their origin.

Round Epithelial Cells, with distinct nuclei, are of renal origin, and are the result of some change in the renal tubules.

Pus in acid or neutral urines presents an opaque white deposit, but in alkaline urines it occurs as a gelatinous ropy precipitate. Treated with water alone a nucleus may appear, but this is rendered more apparent by the addition of acetic acid. The nucleus then comes out cleft into two, three, or four segments, and if an excess of acid be added, the cell wall disappears and the nuclei float free in the fluid. Liquor potassæ forms with pus a viscid ropy substance like white of egg : this is known as the "Vienna test."

Tube Casts are almost always the result of renal inflammation, and are supposed to be produced by a fibrinous exudation into the tubules, forming moulds or casts (Ralfe). If these are washed away without the separation of epithelial cells, *hyaline* casts are formed ; if blood

corpuscles are mingled with them, *blood casts* are formed; if epithelial cells adhere to them, *epithelial casts* are seen; if the epithelial cells have undergone degeneration, *granular* and *fatty* casts make their appearance. Sometimes the hyaline casts undergo amyloid degeneration, and they are then termed *waxy* casts. They then give a deep stain with iodine. Tube casts are, as a rule, trustworthy evidence of renal inflammation, recent or old. If recent, as in acute Bright's disease, the casts seen are *hyaline*, *blood*, and *epithelial*; if old, as in chronic Bright's disease, the casts are *granular*, *fatty*, and *waxy*.

Characters of the Urine in Disease.—We will now briefly give a summary of these on salient points.

I. *The Urine in febrile States.*—In fever the urine is diminished in quantity, deeply coloured, and of high sp. gr. On standing it often deposits an abundant sediment of urates. Microscopically it exhibits a profusion of crystals of uric acid and urates, and occasionally a few hyaline casts with scattered leucocytes and renal epithelium. It commonly contains a small quantity of albumen, and in recovery from scarlet fever a daily examination as to the presence or absence of albumen should be made and the result noted. In pneumonia the presence or absence of chlorides will be noted. If the case is in the stage of consolidation they are diminished or absent from the urine, but they are again detected when resolution begins.

II. *The Urine in congestive Disorders of the Circulation.*—The characters here are similar to those observed in fever, with the exception that the deposit of urates is not marked, and albumen, if present, is in greater quantity. Microscopically, especially when the congestion is chronic, the urine exhibits some leucocytes and altered blood corpuscles, often also hyaline casts, a few granular casts, and renal epithelium.

III. *The Urine in Disease of the urinary Organs.*—1. Renal affections. (*a*) *Acute Nephritis.* Here at first the urine is diminished in quantity, of acid reaction, and high sp. gr. 1·020-1·025. Its colour ranges from blood-



BLOOD CASTS
EPITHELIAL CASTS



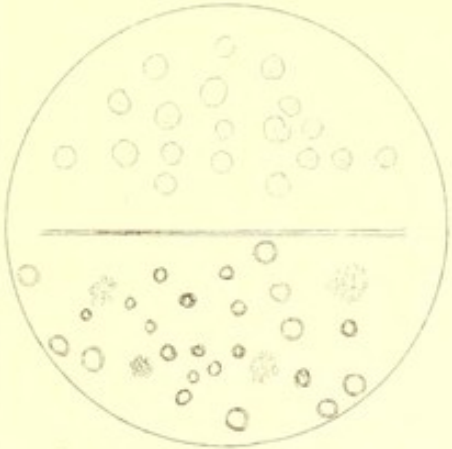
HYALINE CASTS



GRANULAR CASTS



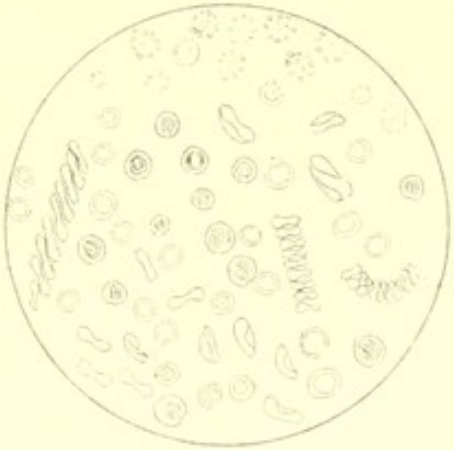
WAXY CASTS
FATTY CASTS



MUCOUS GLOBULES
FAT GLOBULES



VIBRIOS BACTERIA
SPERMATOZOA



BLOOD CORPUSCLES



EPITHELIAL SCALES
PUS CORPUSCLES

red to that of a watery extract of meat, and the presence of blood pigment can be detected by Heller's test. Albumen is abundant. The sediment under the microscope at the outset of the disease, as in nephritis after scarlatina, shows—1. Red blood corpuscles, presenting the appearance of washed-out discs and irregularly-shaped bodies. 2. Some leucocytes. 3. Epithelium. Chiefly small uninuclear cells from the urinary tubules, with a few others derived from the renal pelvis and bladder. 4. (*a*) Blood casts containing red corpuscles. (*b*) Casts formed mainly of leucocytes. (*c*) Epithelial casts. (*d*) Hyaline.[1] (*e*) After the lapse of a few days, and side by side with those described, appear the metamorphosed casts, granular, waxy. If death from uræmia or œdema of the lungs does not ensue, the urine becomes more abundant and the colour paler. The albumen is less marked, and finally ceases with the approach of death.

(*b*) *Chronic Nephritis.*—The urine is normal in quantity, or somewhat lessened, acid, and of normal sp. gr. It usually contains a considerable proportion of albumen. Microscopically the sediment is variable in character, but renal epithelium is never absent, and the casts are often fatty. Granular and hyaline casts are observed covered with blood corpuscles or renal epithelium.

The occurrence of casts composed of fatty matter or overlaid with fat crystals indicates advanced fatty degeneration of the kidneys.

(*c*) *Contracted granular Kidney.*—The quantity of urine in the twenty-four hours is greatly increased. Its reaction is acid, and the sp. gr. low, 1·008-1·012. The colour is pale, and there is little albumen—sometimes only a trace. The sediment as a rule is scanty, and under the microscope exhibits merely a few hyaline and granular casts.

(*d*) *Amyloid Kidney.*—The characters of the urine are for the most part similar to those mentioned under the granular kidney. The quantity is increased (though

[1] The hyaline casts are more or less beset with epithelial cells and blood corpuscles.

sometimes normal), the reaction acid, and the sp. gr. low. As a rule, however, it contains more albumen. Microscopical examination of the sediment shows, as a rule, though subject in this respect to much variety, hyaline casts in comparative abundance, and some epithelium.

(*e*) *Uræmia.*—The urine in cases where symptoms of uræmia supervene is always loaded with albumen, and microscopically resembles that of nephritis. In quantity it is very scanty, the sp. gr. is below the normal standard; sometimes there is total suppression. When the quantity excreted remains unaltered it is always observed that the sp. gr. is greatly reduced.

IV. *The Urine in Hepatic affections.*—In all diseases which seriously involve the proper structure of the liver, the excretion of urea is diminished, and in acute yellow atrophy it is entirely suppressed. It is then to some extent represented by other nitrogenous substances, as leucin and tyrosin, and together with these certain non-nitrogenous substances.

Albumen may be detected in the urine when there is no structural disease of the kidneys, and seems then chiefly to be dependent on the following factors: errors of diet, muscular exertion; or it may be paroxysmal in character, or simply what is termed persistent. In all these cases *no* tube casts can be detected under the microscope.

I. *Dietetic.*—Albuminous substances in food are in health transformed by the digestive process to such an extent that no albumen is found in the urine. Occasionally this transformation is not complete, albumen is detected in the urine, and this incomplete transformation is often associated with the taking of such substances as eggs, cheese, new bread, or pastry. Sometimes the albuminuria cannot be attributed to any particular kind of food, but seems to be caused by all nutriments, and for this condition no satisfactory explanation, chemical or physiological, can be given.

II. *Muscular Exertion.*—In such cases the urine voided after breakfast and after some exercise has been taken contains albumen, but at other periods of the day,

if rest is maintained, it is absent. If, however, active exercise, as walking quickly or riding sharply, is indulged in, then albumen will again appear, with, as a rule, an abundant deposit of oxalates.

III. *Paroxysmal Albuminuria.*—This condition is very similar to that of hæmatinuria, for the attack commences with a rigor and pain in the small of the back. The urine passed is dark in colour, and remains so during two or three micturitions.

IV. *Simple persistent Albuminuria.*—In such cases, which are rare, the urine passed always contains albumen, but with no tube-casts.

Treatment.—In the dietetic and paroxysmal form chloride of ammonium, with regulation of diet, is the best remedy. In the muscular form, active exercise should be forbidden, but exercise with dumb-bells in a sitting position does not do harm. Massage is also said to be beneficial. In the paroxysmal form possibly ergot is the medicine from which most benefit may be derived. The health in the forms mentioned is generally below par, but albumen may be found in the urine of persons who, so far as can be ascertained, are in good health. This condition is termed by German writers Physiological Albuminuria, and they state that it depends upon a congenital deficiency in the power of the glomerular epithelium to resist the passage through it of albumen. This physiological albuminuria is sometimes detected by medical officers acting for insurance companies, and the question occurs, Should such lives be accepted? The reply is, Yes, with a slight extra premium, if there is no history of a former attack of nephritis, and if no tube-casts are found in the urine.

Congestion of Kidney.—Active congestion of the kidney is considered under Acute Nephritis, but it seems advisable here to refer to congestion of the kidney, which is not active but passive. Experimental researches show that impediment or obstruction to the return of blood from the kidneys induces passive congestion of these organs, and if sufficiently intense and prolonged, causes

albumen to appear in the urine. We have in some diseases the same impediment or obstruction. This may be thoracic, as in valvular heart-disease, emphysema, pleuritic effusion; or abdominal, from tumours, a gravid uterus, or a cirrhotic liver.

It is difficult to separate such cases of albuminuria from those of chronic Bright's disease by any pathological standard, yet their clinical features are distinct. For chronic Bright's diseases, to be afterwards considered, are diseases *per se*, affecting chiefly the kidneys; while passive congestion seems to be only an adjunct to other diseased states of the system, or symptomatic of certain natural conditions, as pregnancy. The leading clinical distinctions of passive renal congestion are as follows: it makes no independent progress; it varies with the obstructive process (the rising or falling of the venous obstruction); it does not cause a fatal termination; it remains as it were subsidiary and only symptomatic.

Treatment.—In passive congestion the remedies against the original cause of the congestion should be put in force. Passive congestion from lung and heart diseases can be relieved only by remedies acting on the original complaints. Thus absorbents or paracentesis for chronic pleurisy, digitalis to assist the labouring heart in valvular disease, and the remedies employed in these affections should be aided by appropriate diet.

The special treatment for albuminuria with pregnancy is considered at p. 403, under Uræmia.

BRIGHT'S DISEASE

The kidney has a thin translucent lightly-adhering capsule, and beneath this capsule is the kidney proper, containing a complicated and convoluted series of tubes lined with epithelium; and lying between the tubes, supporting and binding them, is a thin delicate web of fibrous tissue, and an abundant supply of blood-vessels to enable it to perform its secreting function. Each and

all of these various parts may be affected with disease, but, as can be conceived from the intimate union existing between them, one cannot be affected without the other sympathising, whatever may be the original starting-point. Diseases implicating the tubes, fibrous tissue, and blood-vessels thus merge into one another.

The name Bright's disease is deservedly given in honour of the illustrious physician of Guy's Hospital, who, in 1827, threw the ægis of his name round all kidney affections associated with albumen in the urine.

ACUTE BRIGHT'S DISEASE

Acute Nephritis.—*Synonyms*, Acute Albuminuria, Acute Desquamative, Parenchymatous, Tubular Nephritis.

The kidney is always enlarged, sometimes to twice its natural size, its capsule easily stripped off, its colour in the earlier stage deep red, and the section dripping with blood ; in the later stage, it is mottled red and white, and under the microscope there is observed an immense increase of the epithelial cells of the convoluted tubes, which are thus choked up to a greater or less extent, and compress the renal capillaries, while the intertubular stroma is unaffected. From this condition it may pass on to recovery, or remain what will be afterwards described as the LARGE WHITE KIDNEY ; or the disease may terminate in death by dropsy or other intercurrent affection, as pneumonia, pleurisy, and pericarditis.

Causes and Symptoms.—It may be the direct result of cold or intemperance, or occur during convalescence from scarlet fever or other blood-poison. Fever, pain in the loins, and marked diminution of urine characterise the early stages of this affection. The urine is also albuminous, smoky coloured, or dark brown from the admixture of blood, and contains epithelial and blood casts. The specific gravity is high from decrease of water and increase of solid constituents. Dropsy supervenes. If a favourable termination ensues, the urine

becomes more abundant, the skin moist, blood, albumen, and tube-casts disappear, and convalescence and recovery are established in a varying interval of weeks or months. A large proportion—Frerichs says two-thirds—recover.

Treatment.—In the case of acute nephritis it is necessary to order the patient to remain in bed, if we wish to render the prospect of a speedy and favourable issue more certain. By insisting on this we keep up a uniform and constant warmth of the skin, and avoid any danger attached to cooling of the cutaneous surface and thereby inducing additional fluxion to the kidneys. We try to diminish the inflammatory process by remedies, which produce diaphoresis and otherwise relieve the strain on the overloaded tubes of the kidneys. To accomplish these objects the bowels should be freely moved by jalap or elaterium (F. 27). The nitrate of pilocarpine should be given subcutaneously in $\frac{1}{6}$-$\frac{1}{3}$ grain doses. Its sudorific action is rapidly produced, and it not only removes water from the body, but by taking away urea and other products of tissue waste, it notably tends to diminish the risk of uræmic convulsions. Perspiration may also be induced by packing in wet cloths; by a hot air bath, the patient, covered with blankets, being seated on a cane-bottomed chair, under which are placed two or three lighted spirit lamps; or by a hot bath with a temperature at first of 100° F. gradually raised to 107° F. in which the patient rests so long as he feels comfortable. After half an hour, or an hour at longest, in this bath, the patient should be carefully rubbed down, and placed in a warm bed, with an extra supply of blankets. To aid diaphoresis hot water should be sipped, and a mixture of acetate and citrate of potassium in an infusion of digitalis should be ordered. Locally dry-cup the loins and apply linseed-meal poultices.

Dietetics.—The drain upon the system occasioned by the loss of albumen and blood brings on loss of strength and flesh, and therefore the diet should be one that can be easily assimilated, while at the same time it improves the general nutrition. The ideal fare for these objects consists in milk and buttermilk, soups with rice and barley,

lemonade. The use of tea and coffee should be forbidden, as they exercise an irritating action on the kidneys.

Other lines of treatment have been recommended less active than "hard purging and sweating."

1. The skin being kept just moist. 2. A daily evacuation from the bowels. 3. Mild diuretics, as citrate or bitartrate of potassium, with a free supply of water. 4. Only milk and arrowroot. Dr. Bartholow of Philadelphia uses nitro-glycerine, 1 to 2 m. of the official solution every three or four hours, immediately after the subsidence of the acute symptoms. M. Bouchut of Paris states that fuchsin (rosaniline hydrochloride)—dose, one grain thrice daily in aromatic water—will promptly, after the acute stage, check the secretion of albumen.

CHRONIC BRIGHT'S DISEASE

Synonym, Chronic Albuminuria.—Three chief types are recognised as post-mortem appearances of those dying of chronic Bright's disease.

A.—Chronic Nephritis.—*Synonyms*, Chronic Parenchymatous, Tubular or Diffuse Nephritis, Large White Kidney of Nephritis.

The structural changes in the LARGE WHITE KIDNEY are similar to those described in the acute form of active congestion of the kidney, but advanced to a further stage. The kidney is enlarged and the capsule is easily stripped off. Patches of blood-vessels are seen on the white marbly surface. On section the cortical substance is observed to be greatly increased; its colour being ivory white, or, if fatty transformation has ensued, yellowish. The cones retain their usual hue, but they appear abnormally red, from the contrast they present to the white cortex.

The microscopic changes, as described by Professor Grainger Stewart, are essentially confined to the uriniferous tubes. The epithelial lining is enormously increased in quantity, and thereby the tubes are distended

and enlarged. The cells are swollen, opaque and granular, and often loaded with oily particles. In the pure form the interlobular tissue is not altered to any extent. Transparent fibrinous effusion and blood are sometimes seen within the tubules. The Malpighian corpuscles are not often enlarged, but retain their normal size, and their capsules are thin.

The large smooth kidney generally remains smooth and enlarged until death occurs. Should the patient survive long enough, the enlargement gives place to shrinking, which is progressive, so that in some instances the weight of the kidney may be reduced to one ounce.

When this atrophic change is reached the capsule is thickened, and adheres to the surface of the organ, and a slight granular condition is observed. There is a relative increase also of the fibrous stroma, with a destructive and gradual absorption of the distended tubules and their epithelial contents.

When the large white kidney is infiltrated with fat, it constitutes one form of the fatty kidney—oily particles being found in great numbers in the substance of the epithelium and lying free in the tubules. Such a fatty change results more often from cold than from scarlatina.

B.—Granular Kidney.—*Synonyms*, Chronic Interstitial Nephritis, Contracting Granular Kidney, Gouty Kidney, Cirrhosis of Kidney, Fibrosis of Kidney.

In this form the kidney is diminished in size, reduced in weight, and the colour is brown or brownish-red. The surface is rough with numerous rounded elevations, which vary in size from a pin's head to a hemp seed, or even a small pea. These rounded eminences give rise to the granular appearance. In contradistinction to what is observed in the "large smooth kidney," the capsule is adherent to the surface of the organ, so that in peeling it off the glandular surface is injured. On section, the cortex is visibly atrophied, as compared with the cones, and forms a thin rim of only a line or less in thick-

ness round the bases of the pyramids. Its colour is red or brownish-red, and the texture is coarse and granular.

The entire organ is in fact tough and resistent, and its weight is reduced to two or three ounces or less. In that form of granular kidney produced by gout, there may be seen, in the pyramidal portion, longitudinal white or yellowish streaks caused by a deposit of urate of sodium. When a section of granular kidney is placed under the microscope it will be observed that there is manifest destruction of the secreting tissue, and this destruction is brought about by extensive wasting of the glandular structure proper. The Malpighian bodies are shrunk to half their size, and are unnaturally crowded together. The uriniferous tubes are altered. Some are stripped of epithelium and reduced to tubular threads ; others, equally denuded, contain glassy cylinders ; while others again are full of broken-up epithelium. Oil is sometimes found in the fibrinous exudation and disintegrated epithelium, but not so often or so abundantly as in the large smooth kidney. Between the wasted structures lies a large quantity of connective tissue, which gives the organ its peculiar resistance. The arteries show thickening of all their coats—the increase being specially marked in the muscular coat.

Sometimes the degeneration is not complete but partial, the sound portion being perfectly smooth with the capsule easily detached, while the diseased portion is granular and knobby, with the capsule firmly adherent. Dr. Bright's original description of the kidney is terse and complete, and not being clouded with redundant verbiage is easily remembered : "The kidney is rough and hard, and gives resistance to the knife in attempting to cut into it. Numerous projections are seen on the surface, not much exceeding a pin's head. The tubular portion appears to be drawn near to the surface. IT APPEARS TO BE, IN SHORT, LIKE A CONTRACTION OF EVERY PART OF THE ORGAN, WITH LESS INTERSTITIAL DEPOSIT THAN IN THE LAST VARIETY."

C.—Lardaceous Kidney or Waxy Kidney.—*Synonym*, Amyloid Kidney.

Externally the waxy kidney is smooth, and the capsule peels off easily. The organ is as a rule enlarged; occasionally it is diminished in size. On section, the cortex is observed to be bloodless, of a white or yellowish colour, with a waxy smooth appearance like bacon-rind or white beeswax. On the smooth cut surface the natural appearance is altered, for it is dotted over with bright glancing points, which are the altered Malpighian bodies. The cones are unnaturally red and distinct. Under the microscope with a thin section, the waxy change is seen to affect first the Malpighian corpuscles, and when no reagent has been added they appear as shining particles with thickened capsules, the vascular tufts being greatly distended and having the characteristic reaction to be afterwards mentioned. In advanced cases the vasa afferentia, with the arteries and the capillary network of the cortex, and even the vessels of the pyramids, are similarly affected. Later on the epithelial cells of the uriniferous tubes are commonly shrunken and sometimes infiltrated with fatty molecules. Only rarely are they the seat of the waxy change, but the basement membrane of the tubes is frequently affected. Hyaline or waxy casts appear in some of the tubules.

It is to be noted that the liver and spleen are also usually enlarged and in a waxy condition when the kidneys are so affected.

Virchow considered that the violet colour produced by iodine and sulphuric acid when applied to a section of the waxy kidney, showed that it belonged to the same group as starch and cellulose, which give the same tint with these reagents. Later analyses show that the waxy kidney contains nitrogen, as much as 15 per cent, in almost the same proportion as the protein compounds. No sugar could be produced by boiling it with dilute sulphuric acid; but it yielded a violet colour with the cupro-potassic solution, dissolving completely in dilute caustic potash, and being precipitated from this solution

in a white flock by acids. It thus resembled albuminous compounds, the exact proportion of carbon, hydrogen, and nitrogen being, according to Kekulé, in a selected specimen of lardaceous kidney, C. 53·58 ; H. 7·00 ; N. 15·4—nearly the same percentage as occurs in albumen. Virchow's term, amyloid, is thus by late investigations proved to be a misnomer, and it sometimes leads to hazy ideas as to the connection between waxy degeneration and the (genuine) amyloid substance found in the healthy liver.

The student, after having read the description of the pathological changes in acute and chronic Bright's disease, should tabulate these changes—for this is a good aid to individual memories—under 1, colour ; 2, size ; 3, appearances to the naked eye on section ; 4, microscopic changes of different structures of the organ.

THE LARGE WHITE KIDNEY,

following on the acute form or having a latent undetected origin, is attended with dropsy, the countenance being puffy and pasty. The urine is scanty, containing CASTS—EPITHELIAL, FATTY, OR HYALINE ; and the specific gravity normal or rather high, with albumen always present.

The average age of the patient is twenty-eight years. Recoveries and relapses are frequent. In fatal cases the ordinary duration of the disease is under six months, and in exceptional cases it may extend over some years.

THE GRANULAR CONTRACTING KIDNEY

is associated with middle age, not youth, being most common about fifty years, and more frequently observed in males than females in the proportion of two to one. Its commencement is insidious, the early symptoms slight, the progress slow, and the disease may run a latent course for months or years. The first evidence of

the disease may be frequent and severe headache, or simply hemicrania, or loss of strength, or vertigo, palpitation, and difficult breathing. Any one of these symptoms occurring in a person of middle age is suspicious, and may attract attention to the kidneys. In others frequent micturition and some slight puffiness of the ankles lead to an examination of the urine, which is found to be copious in quantity (three to four pints), of low sp. gr. and with a COMPARATIVELY SMALL QUANTITY OF ALBUMEN. THE TUBE-CASTS ARE FEW, AND, IF PRESENT, ARE CHIEFLY HYALINE OR GRANULAR, with but little epithelium or fat. In later stages the urine becomes scanty and the albumen more abundant. The general health gives way, the pallor becomes pronounced, chest and stomach derangements increase, and death ensues through exhaustion, or with symptoms of œdema of the lungs, uræmia, or other intercurrent affection. As harbingers of speedy decease may be mentioned obstinate vomiting and diarrhœa, with itching of the skin and drowsiness. How the chronic nature of the disease gives rise to increase in the heart's structure is as yet an undetermined question; still, in nearly 50 per cent of the cases there is hypertrophy of the left ventricle, and also a peculiar form of retinitis. The most consistent explanation of the hypertrophy is given by Traube, who attributes it to increased tension in the arterial system, this tension of necessity taking place as soon as a great number of arterial branches in the kidneys, with the Malpighian tufts attached to them, become obliterated, thus reducing the channels through which the blood of the renal artery can drain away. The hypertrophy of the left ventricle he regards as being for some time a necessary and efficient compensation for the loss of renal secreting tissue, and so long as the hypertrophied heart labours energetically no uræmic symptoms occur, for an over-abundant secretion of urine is being carried on. To the high arterial pressure on the vascular tufts is also attributed the albuminuria.

Gull and Sutton go further than this, and state that

there is fibrous thickening of the coats of the small vessels through the whole arterial system, and thus deny the claim which the kidney has as the special causative factor of the ventricular hypertrophy. They state that this general arterio-capillary fibrosis leads to thickening of their walls, with loss of elasticity and subsequent wasting of the tissues, and so gives rise to the hypertrophy in question. See also p. 282, under Diseases of the Arteries.

Retinitis Albuminurica occurs chiefly in connection with the granular contracting kidney, although it has been observed also in the nephritis incident to pregnancy and following on scarlet fever. Diminution of the sharpness of vision develops itself gradually, and an ophthalmoscopic examination in the early stage shows the papilla of the optic nerve grayish-red and swollen, with its margin indistinct and blurred; the veins of the retina enlarged and tortuous; the arteries constricted. Extravasations of blood are also observed on the retina, and white spots of various forms, from fine points up to large patches. In the course of time the white spots extend, and larger and smaller extravasations stand out. These retinal changes may subside and the white patches become smaller, with the vessels visible and the margin of the disc sharper in its outline. Yet a permanent recovery is only to be hoped for in the acute nephritis of pregnancy and scarlet fever.

THE WAXY KIDNEY

is associated usually with amyloid disease of other organs, as liver or spleen, and with a previous history of syphilis, phthisis, caries, long-continued suppuration, or other exhausting conditions. It is characterised by a large flow of urine, 100 to 200 ounces being passed in a day. THE URINE HAS A LOW SP. GR., WITH FEW TUBE-CASTS, GENERALLY HYALINE IN CHARACTER. The albumen is at first slight, but as the disease advances, the urine, as in the previous form described, becomes of higher sp. gr., and

the albumen more abundant. Dropsy does not, until the late stages have been reached, form a prominent feature of the disease. The disease may not be recognised at first, and hence may extend over a series of years. Indeed, it seems to form a part of various constitutional states, and upon these its ultimate issue depends.

TREATMENT OF CHRONIC BRIGHT'S DISEASE

requires careful management, and is based on diet, climate, and medicine.

Diet and Climate, etc.—Flannels should be worn next to the skin, and daily exercise should be permitted. As far as possible a milk diet should be taken, and all strong alcoholic stimulants forbidden. Yet, to obviate anæmia, three ounces of claret with soda or lithia water are useful. Fats and carbohydrates aid treatment, but animal food should be eschewed as much as possible, and for those who cannot digest milk readily, reliance should be placed on a vegetable diet which contains least vegetable fibre, as potatoes, rice, and onions. Ripe fruits are also beneficial. The fact that renal disease as a rule is not common in tropical or very cold countries indicates that the humid and variable climate of this country should be exchanged for one which is uniform and dry. Algiers or Cairo during winter can be recommended. A long sea voyage, as to New Zealand or South America, is at any period of the year of unquestionable utility.

The constant draining away from the blood of one of its most important constituents necessitates the administration of *tonic medicines*, and of these experience has shown that iron in some form is the best. The tincture of the perchloride alone often causes headache, but to some extent this is avoided by combining it with dilute phosphoric acid and spirit of lemon (F. 90*a*). The scaly preparations, or the syrup of the phosphate, or the iodide of iron can be recommended. In whatever preparation iron is prescribed, it should be continued with persever-

ance. In females dialysed iron with glycerine is sometimes serviceable. Other treatment is symptomatic, for we have no medicine which directly or permanently diminishes the quantity of albumen daily lost.

Purgatives are of great value; thus compound jalap powder and bitartrate of potassium may be ordered twice or thrice a week, or morning draughts of the bitter saline waters of Friedrichshall or Hunyadi Janos. If circumstances permit, and no headache attends their being taken, then Turkish or Russian baths are undeniably useful. By careful diet, by removal to a warm climate during winter, by judicious use of purgatives and baths, many cases of chronic Bright's disease may be greatly benefited, and a fairly healthy life enjoyed. If dropsy, notwithstanding palliative measures, sets in, then a hydragogue cathartic, such as pulv. elaterini co., given every third night, is required. Diuretics now should also be ordered, and of these the most potent in my experience is Trousseau's wine—the ingredients to be used, the method of preparation, and doses are indicated under (F. 40*a*).

Strophanthus or caffeinæ citras have sometimes, for a longer or shorter period, a rapid and surprising action.

The best diaphoretic is a preparation of jaborandi, by the mouth or hypodermically, in the form of the nitrate of pilocarpine. It induces, without fatigue and without danger, copious perspiration, which it is advisable to bring on every second or third day.

In extreme dropsy punctures or incisions may be made into the skin of the legs or scrotum. Dr. Southey's drainage tubes can be specially recommended as safe and useful. These consist of a perforated needle, which is inserted into the swollen legs, and to this gutta-percha tubing is attached and placed in a vessel below the bed. The needle should enter the skin after having pierced a small piece of boracic lint placed on the surface. All chance of erysipelas is thus avoided.

THERE CAN BE NO DOUBT THAT OPIATES SHOULD NOT BE GIVEN. This statement includes preparations of opium, chloral, belladonna, and stramonium. In extreme

restlessness the bromides of potassium and ammonium may be administered in large doses. Should excessive drowsiness result from their use, it may add to the danger of the poison of the disease, and should be combated by caffeinæ ammonio-citras gr. v., or iodide of potassium gr. vi., thrice daily. Hoffman's anodyne (sp. æth. co.) may sometimes be substituted for the bromide of potassium, and a few drops of ether may be inhaled when there is great distress in breathing.

OTHER DISEASES OF THE KIDNEYS

We may say in general terms that the kidney or kidneys may be attacked by CANCER, either primary or secondary, usually of the encephaloid form, and that the leading symptoms of the former are a tumour in the abdomen, sometimes very large, and hæmaturia; that TUBERCLE or HYDATIDS may also originate in the organ, exhibiting in neither case very well-defined symptoms, though resulting fatally in both; that when any impediment exists to the flow of urine from the kidney, DROPSY of the kidney, or HYDRONEPHROSIS, may ensue, through dilatation of the pelvis, with atrophy of the cones or whole substance of the organ; and that, finally, one or both kidneys may be shifted from their original position, occasioning the condition known as MOVABLE KIDNEYS. To enter, however, further into details would be foreign to the object of this handbook.

SUPPRESSION OF URINE.—Professor Grainger Stewart states that suppression of the secretion of urine arises under two conditions—1*st*, when there is obstruction in the line of outflow; 2*d*, when there is some fault in the kidney itself.

1. OBSTRUCTIVE SUPPRESSION.—This is most commonly due to the impaction of a calculus in one ureter when the other kidney has been permanently destroyed; or from the presence of a tumour, as of the bladder and uterus, pressing on both ureters.

Urine in such cases is passed in small quantities, pale, and of low specific gravity. When suppression is complete, the duration of life appears to vary from nine to eleven days, death being preceded for two days by muscular twitchings, contraction of the pupils, drowsiness, and rarely convulsions, with no dropsy or urinous odour of the breath.

2. Non-obstructive Suppression.—In the course of acute Bright's disease complete suppression of urine may take place. It may also occur in the cirrhotic or granular form of Bright's disease, or as a consequence of injuries to the urethra, or in the algid stage of cholera.

Treatment.—This consists in giving hot baths and local fomentations, avoiding the administration of all powerful diuretic medicines, which would only aggravate the condition of matters. In cases of obstructive suppression kneading the abdomen has been successful, and the passing of a sound into the ureter of a female has been favourably reported on.

PYELITIS

Inflammation of the pelvis of the kidney or Pyelitis usually arises from (1) direct irritation of foreign bodies in the pelvis and infundibula of the kidney as calculi and gravel; (2) obstruction to the passage of urine by decomposition of the retained urine; (3) inflammation of the bladder spreading along the ureter to the pelvis. Occasionally it may be produced by overdoses of cantharides or turpentine, or it may occur during the course of continued fevers, the exanthemata, diphtheria, and cholera. The mucous membrane is swollen, its vessels injected, and the surface covered with muco-pus. If this condition is persistent, marked suppuration may be established, and if its cause be a calculus there may be ulceration, not merely of the mucous membrane, but also in the substance of the kidney. This may be designated Suppurative Nephritis. If the pus can escape

easily by the ureter, and if one kidney only be affected, the mischief may continue for years with little except local uneasiness, and in some cases this also disappears. But, in other cases, and whether or not the ureter is obstructed, an ABSCESS may form, enlarging and pointing in different directions. Sometimes it penetrates the diaphragm; points in the loins; bursts into the peritoneum, or descends along the psoas muscle and is seen under Poupart's ligament.

Symptoms.—Pain and tenderness in the loins, increased by pressure or movement, irritability of the bladder, sickness, fever, and thirst, and the passage of urine containing albumen, characterise the early stage of the affection. Later on the urine contains pus in notable quantities, and if *suppurative nephritis* be established, the local pain is greatly increased, rigors and hectic fever are manifested. In most cases a typhoid condition supervenes, with suppression of the urine and death by exhaustion.

Treatment.—In the early stage it is advisable to leech or cup the loins, and to follow this up by fomentations or a hot bath. The bowels should be freely moved by a hydragogue cathartic; warm fluid liquids should be drunk, and citrate of potassium administered with small doses of opium if there be much pain. If the case be more chronic, astringents are commonly employed, as the mineral acids, perchloride of iron, acetate of lead, and in very chronic cases oil of sandal wood, copaiba, or benzoic acid are given. If an abscess has formed surgical treatment is obviously necessary.

URÆMIA.—When urinary products accumulate in the blood, the condition is termed Uræmia. To obtain a clear conception of this condition it is necessary to remember that these products act as poisons, which specially affect the nervous centres. Their accumulation may be slow, and corresponding to the smaller dose of the poison, the symptoms may be slight, yet they are in kind, though not in degree, as indicative of uræmia as the more severe symptoms, to which alone the name of uræmia is given.

It was at one time supposed that urea, or carbonate of ammonium resulting from its decomposition, was the poisonous material, but this assumption is now disproved, and so also is the idea that it depended on excess of potassium salts in the blood. The uræmic blood contains an excess of urea and extractives, but its alkalinity is less than normal.

It is now believed that the uræmic symptoms are due in general terms to the excessive accumulation of fixed products in the blood, and the interesting researches of Bouchard go far to show that they may be referred to the toxic effects of certain bodies resembling alkaloids (ptomaines) normally existing in the urine.

The earliest and most constant of all the symptoms is vomiting, which at first occurs in the morning before food has been taken, but afterwards the vomiting follows on every meal, or sometimes apart from the ingestion of food. It is sometimes so persistent as to lead to death by exhaustion, and when it is thus extreme there may be no twitchings, coma, or convulsions.

Much more frequently, however, the retained poisons affect the nervous centres, as is evidenced by the occurrence of seizures precisely like those of epilepsy. Their onset may be sudden, or preceded by a few hours or days by headache, by vertigo, by transient pains in the limbs, or by dyspnœa, paroxysmal in character and resembling an attack of asthma.

During the convulsions there is foaming at the mouth, stertorous breathing, and profound insensibility, and as these symptoms pass away a comatose condition ensues. Before insensibility is over there may be a succession of paroxysms, in which case the attack is very likely to be fatal, yet not always so, for when all hope seems lost, the patient may regain consciousness. A single paroxysm rarely ends fatally.

One of the most remarkable effects of uræmia is blindness, which may follow or precede the paroxysm, and is always complete. It rapidly subsides and the patient regains sight in twenty-four hours, or at the most in the

course of a few days. In some cases uræmia shows itself by slighter symptoms, as short attacks of spasm in the facial muscles or in those of the eyelids, the patient meanwhile retaining consciousness or being at the most confused or dull. Sometimes irritating cutaneous eruptions are observed.

These symptoms in the acute or less severe forms of uræmia are always associated with *antecedent renal troubles*, and in this way they are diagnosed from those attendant upon epilepsy, cerebral hæmorrhage, or alcoholic intoxication.

In all forms of Bright's disease uræmia, manifested by one or more of the symptoms, may occur, but, as a rule, they only come on suddenly and with great violence in acute nephritis following on scarlet fever, or in the convulsions associated with pregnancy. Convulsions, coma, and death may then succeed each other in a few hours. In most, if not all other conditions these are significant warnings of their existence.

Treatment. — When an uræmic attack has actually begun our resources are but limited, especially in anæmic patients, and consist chiefly of anæsthetics, and for this purpose inhalation of chloroform may be tried, or chloral injections by the rectum. The quantity of chloral in the injection should be 45 grains to an adult, or 15 to a child, and it may be repeated if desirable. Withdrawal of the ascitic fluid, and the subcutaneous injection of digitalin proved successful in one case under my care, and doubtless the injection of pilocarpinæ nitras gr. $\frac{1}{4}$ in 3 minims of water must, on physiological grounds, be useful. Should the attack be sudden, and the blood not greatly impoverished, as sometimes happens in pregnant women, free venesection has much to recommend it, and should not be dismissed as absurd simply because it was the panacea of our forefathers. In all the forms of Bright's disease I have, by means of the ureameter,[1] carefully noted the quantity of urea excreted daily, and when this notably diminishes I suspect the probability

[1] See Appendix (F. 93).

of an uræmic attack, and endeavour to ward it off by drastic cathartics and copious perspiration. Elaterinum, in combination with colocynth, may be selected as the best drastic cathartic for this purpose (F. 27), and pilocarpine injections may be relied on for producing diaphoresis. Benzoic acid, on the supposition that ammonia is the cause of the convulsions, has likewise been recommended in 7-grain doses every three hours. The poisonous alkali, it is thus fancied, may be converted into a harmless acid and a salt.

A word or two here may be fitly added with regard to puerperal convulsions, which seem to be attendant on the albuminous state of the urine. These may be divided into three great classes—

1. The convulsions which commence before labour begins.
2. Those which come on during labour.
3. Those which succeed delivery.

In the first series, several observers state that chloral arrests the convulsions. In the second, the administration of chloral has been attended with excellent results. At the same time labour should be finished as soon as possible by the forceps or otherwise. In the third, one dose of the same drug may terminate the convulsions. How or in what doses are you to give it? 60 grains if you wish strong action, and follow this up by 15 grains if it seems to lose its effect. It should not, however, be pushed beyond 120 grains in the two hours. Some have recommended giving it in a pessary by the vagina. The efficacy of this is doubtful. If the patient cannot swallow, it must be administered by rectal injection.

Hæmaturia, as its name implies, means the admixture of blood with the urine; and this mixture is easily recognised by the colour it imparts to the secretion, unless the quantity is very small, when it may require the aid of the microscope to detect it. Blood or blood-pigment can be detected by Heller's test (see p. 379). Blood in

the urine may originate from different sources, which, as a general rule, can be recognised from the following considerations. If from the kidneys it is found equally diffused, giving to the urine a smoky reddish tint, and after standing some time a grumous-coloured deposit subsides. If from some other part of the urinary tract —*e.g.* if it comes from the ureter, bladder, or urethra— the colour is more bloody, more red, perhaps affecting only the part of the urine which is last voided in micturition, and frequently distinct clots are observed in the deposit. If the clots are large and readily distinguishable, and there is no history of an injury, we may safely infer that the blood is not from the kidney or the renal vessels proper; for in true hæmorrhage from the kidney, the coagula are formed within the renal tubes, and betoken their origin by the cylindrical casts and entangled blood-cells which they present. All urine containing blood is necessarily more or less albuminous.

By far the most common cause is congestion, due to some blow or injury in the renal region. It may also arise from acute Bright's disease, from malignant disease of the kidney or bladder, from the presence of a calculus either in the kidney, ureter, or bladder; or from the taking of irritating medicines, as turpentine or cantharides. Sometimes it is symptomatic, and dependent on other than urinary diseases. Thus it is seen in purpura and scurvy; or it may be found in yellow fever, cholera, or any of the eruptive fevers; and, when detected in the course of these diseases, the prognosis is most unfavourable. At other times it is supplementary either to a normal state or to a diseased condition, *e.g.* it may accompany menstruation in a woman, or a hæmorrhoidal flux in either sex. The endemic hæmaturia of the Mauritius and Brazil is dependent on the presence of a small parasite which infests the mucous membrane of the pelvis of the kidney, or the bladder.

Hæmorrhage from the bladder, due to acute cystitis, fungoid growth, or calculi, is usually recognised by symptoms referred to that organ, viz. very frequent

micturition and pain in the hypogastrium. Urethral hæmorrhage is known by the escape of blood during the intervals of micturition.

Treatment will vary with the causes and circumstances of the hæmorrhage, but when our object is to treat the hæmaturia for itself—to stay the loss of blood—perfect rest is absolutely necessary, and the application of ice to the seat of the hæmorrhage. Thus if the kidneys are the seat, apply ice to the loins unless in nephritis; if the bladder, to the hypogastrium and perineum. In addition to this local application give astringents internally, *e.g.* acetate of lead gr. iii. in a pill every two hours, until six or eight doses have been administered; infusion of matico, ℥i thrice daily; ol. terebinth. m. iii., mist. amygdalæ ℥j, every four hours; or injectio ergotini hypodermica may be used, or tinct. cannabis indica.

In severe vesical hæmorrhage a solution of alum, 20 grains to the pint of water, may be injected into the bladder.

Intermittent Hæmatinuria.—*Synonyms*, Paroxysmal Hæmaturia, Paroxysmal Hæmatinuria, Paroxysmal Hæmoglobinuria.

Intermittent hæmatinuria is a curious disorder, to which attention was first drawn by Dr. George Harley in 1865. The peculiar feature of the disease is the paroxysmal passing of dark-coloured urine, containing not blood, but merely the colouring matter of the blood—hæmatin. A sense of shivering or cold about the loins precedes the paroxysm, which is sudden. The intervals between these are irregular, and there is no certainty about their occurrence; for sometimes the urine at one micturition is clear, and at another bloody-coloured like porter. The patient first experiences coldness of the extremities followed by general chilliness, accompanied by a feeling at the same time of malaise and a desire to stretch himself or yawn. Then is experienced a dull heavy pain in the loins, sometimes with tenderness over the region of the kidneys. These symptoms subside in a period varying

from thirty minutes to two hours, after the passage of the dark-coloured urine, and the patient feels well until the occurrence of the next paroxysm. Microscopically, the urine presents chiefly an immense mass of amorphous granular matter, with dark-coloured granular tube-casts. The prognosis is favourable, though the duration of the disease cannot be defined. It gives the usual reactions of blood with guaiacum and Heller's tests.

In a case reported by me in the *Lancet*, January 1879, there was a fall of temperature preliminary to the rise when the paroxysm occurred.

The liability to paroxysmal hæmoglobinuria seems to be confined to males, age being from 20 to 48.

Cold is generally the exciting cause, and sometimes there is a history of malaria or of a previous injury to the back.

The pathology is obscure, but it seems to originate in the nervous system, and to be connected in some way, not precisely understood, with ague.

Treatment.—During the cold stage send the patient to bed, and administer warm stimulating drinks. Tonics, as iron and quinine, are also indicated (F. 76). Gull recommends ℥ii of tinct. cinch. co. three times a day; Hassall, gallic and tannic acid powders night and morning; Habershon, quinine and arsenic; while Begbie found attacks prevented by 20 grains of sal-ammoniac three times daily.

Chyluria.—By this term is meant the simultaneous appearance of fat and albumen, apart from the manifestations of other morbid conditions such as casts, renal epithelium, etc. Usually the sediment contains in small numbers red and white blood corpuscles.

The urine under these circumstances tends to form coagula of fibrin on standing, and occasionally it becomes completely gelatinous. As yet chyluria has been met with almost exclusively in persons who have lived for a long time in the tropics, and it has been shown to depend upon the invasion into the urinary tract of *filaria sanguinis hominis*. The embryo of this parasite is generally found in the urine, and it appears that the

abnormal condition of the urine is due to unnatural communications between the lymphatics and the urinary passages affected by filaria.

The parasite, as a rule, is detected equally in the blood and urine when the patient is alive. The average length of the embryo is $\frac{1}{75}''$ = (0·34 mm.); its breadth $\frac{1}{3500}$ = (0·007 mm.), or equal to the diameter of a blood corpuscle. It is enclosed in a transparent tubular sac, which is extremely delicate and translucent, and in which the parasite can be seen to contract or elongate itself. After death the worm may occupy the whole of the sac, or it may shrink and leave the tube empty at one or both ends.

It has been recently shown that embryo filariæ in the blood are imbibed by the mosquito, which shortly resorts to water to deposit its eggs, and having achieved this object of its existence, expires; not, however, before it has digested the greater number of the filariæ. It has been supposed that the embryo passes the next stage of its existence as a free nematode, but can only attain its full sexual development by entering the human body; it is believed to accomplish this by penetrating the skin of bathers, and to attain sexual maturity in a short time within the body, the conjunction of the sexes taking place in the lymphatics. Some also suppose that it may gain an entrance into the body by the eating of salads to which the ova or embryos adhere.

Symptoms.—There seem to be no marked premonitory symptoms of chyluria, yet previous to voiding urine the patient may complain of a dull aching pain in the loins, along the ureters and over the bladder; or along the course of the urethra in males. With this there may be marked general debility and lowness of spirits. The urine presents the colour already mentioned, and frequently a strong milky or whey-like odour is perceived, which heat increases.

Sometimes during micturition the flow of urine is stopped by the blocking up of the urethra with clots. The sp. gr. may range from 1007 to 1020. Shaken up with ether the urine loses its milky aspect, and when

nitric acid and heat are applied a precipitate almost invariably results, evincing the presence of fat, albumen, and fibrin. *No casts* have, however, been detected, and the fat chiefly characterises the urine passed after meals.

Chylous urine is more common in adults than in children, in females than in males, and its presence is not inconsistent with fair health. The disease runs a chronic course, and intermissions are not uncommon. A cure, however, can hardly be prognosticated, as the symptoms are apt to return. Patients in otherwise good health with chylous urine sometimes die suddenly from no recognised acute disorder. In persons afflicted with chyluria, who have died, no kidney disease has been detected. Nothing has been found in any of the organs or tissues suggestive of the cause of the urinary derangement, except the fact that all the vessels—arteries as well as veins—in their minutest ramifications contained the filaria.

Treatment.—The disease has neither been modified nor cured by any known remedy. Perhaps the most satisfactory results have followed the administration of large doses of gallic acid—3i to 3ii a day.

Bilharzia Hæmatobia.—The parasite Bilharzia, so called from its discoverer Bilharz, is an elongated, soft-skinned, bisexual entozoon of the nematode or fluke type, the male being half an inch, and the female three quarters of an inch long. It inhabits the branches of the portal system and the minute veins of the pelvis of the kidney, ureter, and bladder. Its *symptoms* vary. If in the liver it gives rise to indigestion. If in the ureter its effects are most destructive, as it leads to narrowing of the duct at the affected spot, causing obstruction to the flow of urine, hydronephrosis and pyelitis. It is, however, mainly vesical in its origin, and at the end of micturition a teaspoonful of dark blood or shreds of mucus are passed. In these shreds the ova of the parasite are found, and on masses of these ova, urinary concretions or calculi may form.

Egypt and the Cape of Good Hope are the countries where the affection is chiefly seen; and it is believed

that it originates the endemic hæmaturia observed there and in other hot climates. The fact that wives of infected husbands have healthy children negatives its being considered a contagious disease.

Treatment.—When the bladder is alone implicated, good results have been obtained by Dr. Harley from daily injections of 20 to 30 grains of the iodide of potassium in 5 ounces of tepid water. With advantage also the same authority prescribed oil of male fern and oil of turpentine every morning, and by this mixture caused the expulsion of large numbers of the ova. The administration of alkalies tends to check the formation of calculi. Prophylactic measures against endemic hæmaturia are—

Water conveyed in *covered channels* from its source to its destination; filtering it before drinking, and bathing in it; and avoiding carefully taking uncooked salads, molluscs, and smoked fish.

Renal Calculus and Gravel.—Uric acid, according to Sir W. Roberts, exists primarily in the urine as a quadrurate, and in health as a quadrurate is discharged in its original state of complete or almost complete integrity; but in certain conditions within the body the quadrurate is precipitated as uric acid. The conditions which tend to accelerate this change are, according to the same authority:—(1) High acidity; (2) poverty in salines; (3) low pigmentation; (4) high percentage of uric acid. And conversely the conditions which tend to postpone precipitation are:—(1) Depressed acidity; (2) richness in salines, especially of potash salts; (3) richness in pigments; and (4) a low percentage of uric acid. On the interaction of these factors the occurrence or non-occurrence of gravel appears to depend; and probably the most important of these factors is the grade of acidity.

Small concretions which may be passed by the urethra are usually termed "gravel"; while larger masses are known as "calculi," or "stone." The varieties of renal calculi are:—(1) Uric acid, which is the most frequent constituent of renal calculi; (2) urates are rare, usually

small and soft, and are nearly always confined to children; (3) phosphates; (4) carbonate of lime; (5) cystin; (6) xanthin; (7) fibrine or blood; (8) indigo.

Clinical History.—When there is merely gritty matter no pain whatever may be experienced, but when the passage of a calculus down the ureter to the bladder is impeded it constitutes what is termed a "fit of gravel" or "renal colic." The pain is then sudden and excruciating, and accompanied by great restlessness, nausea, or vomiting. No posture gives relief, and a cold sweat breaks over the body. There are frequent desires to micturate but little urine passes, and it may be deeply coloured with blood. The testicle on the side of the pain is retracted, and the disturbance of the nervous system may culminate in delirium and even epileptic convulsions.

These symptoms last for a variable time, sometimes only for an hour or two, sometimes for several days, and when fortunately the stone reaches the bladder, great relief is experienced. Shortly afterwards the calculus may be passed by the urethra. But if it becomes impacted it may occasion hydro-nephrosis, or pyelitis, or fibroid contraction and atrophy of the kidney.

Treatment.—In severe cases the patient should be placed in a warm bath for a time and then removed to bed. Warm fomentations or poultices should be applied to the loins and front of the abdomen. He should be encouraged to drink freely of warm water. Our chief reliance, however, must be placed in the subcutaneous injection of morphine in large doses and frequently repeated. In the most distressing case I ever saw, the inhalation of chloroform during the paroxysms of pain was the only method of treatment which gave relief. A visit to Carlsbad or Ems is often useful to prevent a recurrence, and if it be supposed that a uric acid calculus lies in the kidney, Sir William Roberts recommends the use of the citrate of potassium in large doses (F. 39*a*). If the patient's health seems to be undermined by constant pain and discharge of pus the advice of a surgeon should be sought.

DISEASES OF THE NERVOUS SYSTEM

In describing diseases of the nervous system we shall proceed on the following plan :—

A consideration of the anatomy and physiology of the brain and spinal cord, disturbances of nutrition, the nature and uses of electricity, general therapeutics, including diet, mode of life, and massage.

We shall then consider—

1. Diseases of the nerves ; neuritis, multiple neuritis.
2. Peripheral paralysis (motor and sensory) ; neuralgia.
3. Vaso-motor and trophic affections.
4. Diseases of the spinal cord and its membranes.
5. Diseases of the medulla oblongata.
6. Diseases of the substance of the brain and its membranes.
7. Neuroses or functional diseases of the nervous system, of which the anatomical basis is unknown.

LOCALISATION OF FUNCTION

Recent researches and experiments, especially those of Ferrier, have conclusively shown that there are localised areas in the brain, disease of which gives rise to certain symptoms during life. The brain has accordingly been divided into a motor and a sensory zone. The motor zone includes the central convolutions, or those bounding the fissure of Rolando, viz. the ascending and superior parietal convolutions ; the ascending frontal and the posterior extremities of the superior, middle, and inferior frontal convolutions ; and internal surface of the same convolutions, or paracentral lobule.

In this zone are defined centres for the movements of the limbs, head, eye, muscles of expression, and those of the mouth and tongue. The relative position of these centres in the motor area, viewed in the light of the parts

they preside over, is as it were reversed. Thus the centre for the leg is uppermost, while that for the face is lowest; and again, owing to the decussation of the fibres of the medulla, the left motor area is concerned with the movements of the muscles of the right side of the body, and *vice versâ*.

Sensory Zone.—Various experiments have shown that in regions lying posterior to the motor zone there exists a sensory zone, in which there are differentiated centres or areas for sight, hearing, smell, and taste. The visual centre is situated in the angular gyrus, and embraces also the occipital lobe—the occipito-angular region; the auditory area is localised in the superior temporo-sphenoidal convolution; the olfactory centre and centre for taste at the lower part of the temporo-sphenoidal lobe. Destructive lesions of these sensory centres must be bilateral; if simply one-sided they are, according to present experience, unaccompanied by any objective symptoms. Further, no secondary descending degeneration of the spinal cord has been observed in these cases. There is, moreover, reason for believing that some morbid irritations attack the sensory zone, which is evidenced by symptoms in certain nervous diseases, as the hallucinations of insanity and the auræ of sensations of light and colour or of disagreeable tastes and odours, which may precede an epileptic fit. Much obscurity has been cleared away by these investigations, and much misconception abolished, yet elaborate localisation can never efface the broad view that the brain acts as a whole in the healthy organism of a human being. This great fact should not be forgotten when we consider the complicated symptoms and diverse views sometimes deduced from these by leading neuropathologists.

For reference we may now give a summary of some of the principal facts connected with the localisation of diseases of the brain.

I. Hemiplegia from cerebral disease is due to a lesion which, as compared with the limb, affects the opposite

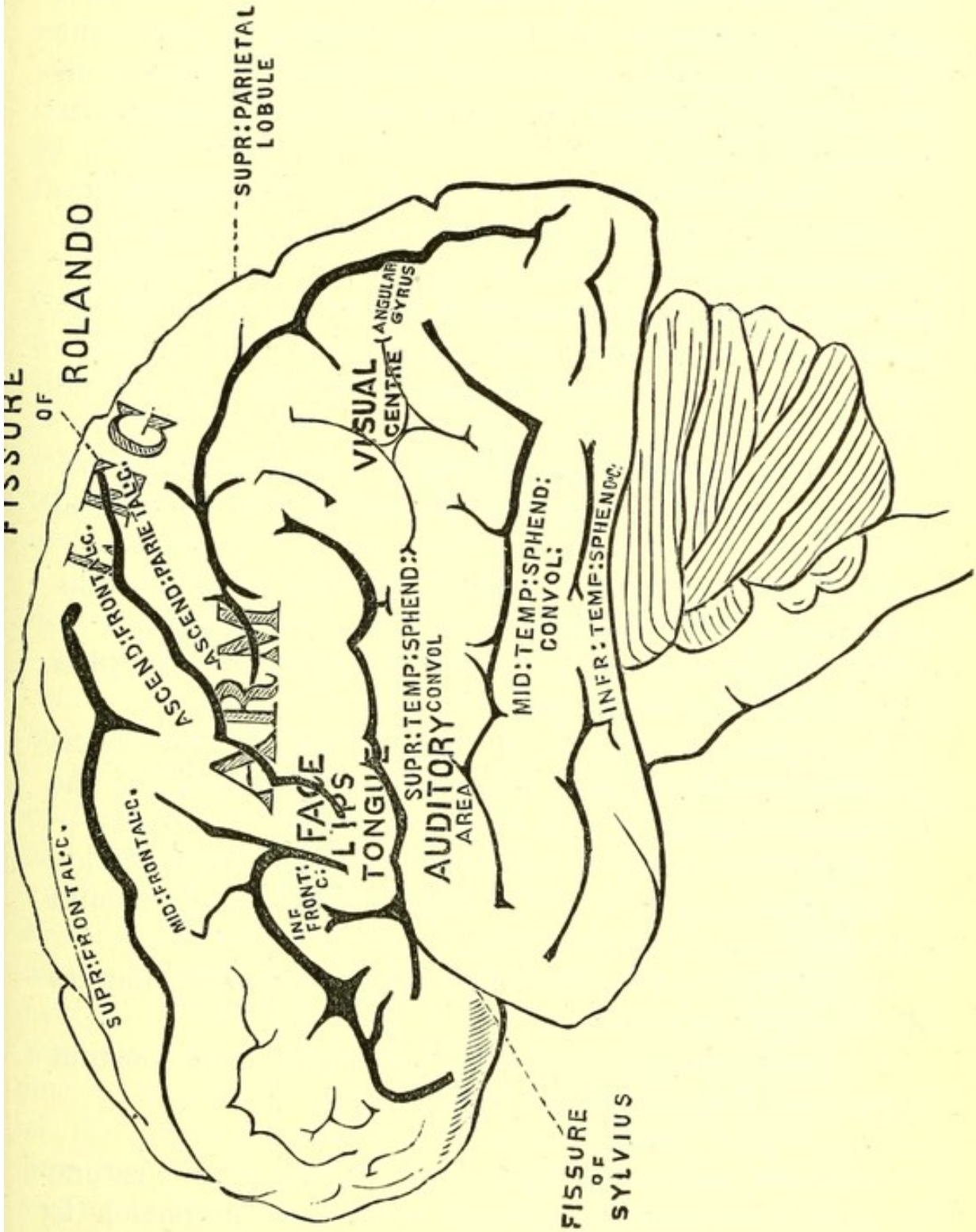


Fig. 18.—Cerebral Localisation.

half of the cerebral hemisphere. This is explained by the decussation of the fibres in the medulla oblongata.

II. Ordinary hemiplegia is occasioned by a lesion of the pyramidal tract in the posterior limb of the internal capsule. Destruction of this tract results in persistent hemiplegia; if only functionally deranged by disease in the neighbouring parts of the brain, the hemiplegia is temporary.

III. Monoplegic cerebral paralysis, as affecting the face and tongue, is the result of lesions in the lower extremity of the anterior and central convolution. Monoplegia of the arm is due to some lesion of the middle third of the anterior central convolution. Monoplegia of the lower extremity indicates some affection of the paracentral lobule.

IV. Hemiplegia or monoplegia, if associated with epileptiform convulsions, is almost always due to cortical lesions.

V. Hemiplegia, with crossed paralysis of the oculomotor nerve, indicates a lesion of the crura cerebri.

VI. Hemiplegia, with crossed facial paralysis, implies a lesion situated in the pons.

VII. Hemianæsthesia (of the skin and of the organs of special sense) results principally from lesions of the most posterior part of the internal capsule.

VIII. True motor or inferior aphasia indicates a lesion of the posterior part of the inferior or third left frontal (Broca's) convolution.

IX. Difficulty in articulation or in swallowing implies disease of the medulla.

X. Giddiness and staggering gait are the most constant symptoms of disease of the cerebellum.

Spinal Cord.—The spinal cord is the great medium for conducting nervous energy from the encephalon to the body. It is not a single organ, but is complex in structure and function. It serves as a medium to convey from the cerebrum motor and sensory impressions. It is continuous with the medulla oblongata, and begins at

the upper border of the first cervical vertebra, and ends in a pointed extremity opposite the upper part of the second lumbar vertebra. In its whole course it is enclosed within the spinal column, and is invested by two membranes, pia mater and arachnoid. Beneath the latter membrane, and in the meshes of the pia mater, lies a certain amount of what is termed cerebro-spinal or subarachnoid fluid. Outside the arachnoid, and enveloping the cord more loosely, is the firm spinal dura mater.

ANATOMICAL STRUCTURE.—The anatomical structure is similar throughout the whole extent of the cord. It is double. The two halves are marked off from each other by a longitudinal fissure anteriorly and by a septum of connective tissue posteriorly. Each half contains a mass of gray matter. These gray masses are turned back to back, and are made continuous by a bridge of nervous matter constituting the GRAY COMMISSURE.

In front of this bridge of gray matter lies some white matter which forms the WHITE COMMISSURE.

Through the centre of the gray commissure runs a fine central canal—the CANAL OF THE CORD—lined with a layer of epithelium-like cells.

The thick anterior extremity of the gray matter in each half of the cord is known as the ANTERIOR CORNU, and the much thinner posterior extremity as the POSTERIOR CORNU. The posterior cornu approaches near to the surface of the cord in the posterior lateral region, and is here joined by the posterior roots of the spinal nerves. Their points of entry on each side divide the white substance of the corresponding half of the cord into posterior and antero-lateral columns. The portions of the white substance of the cord lying behind and between the posterior roots constitute the TWO POSTERIOR COLUMNS, each of which is again subdivided by a slight superficial fissure into an external tract or POSTERIOR ROOT-ZONE, and an internal wedge-shaped portion or COLUMN OF GOLL.

The portions of the white substance which on each side

lie in front of the posterior roots constitute THE ANTERO-LATERAL COLUMNS.

There is no real line of demarcation to define the bounds of the anterior and lateral columns respectively, for the anterior roots are connected with the anterior

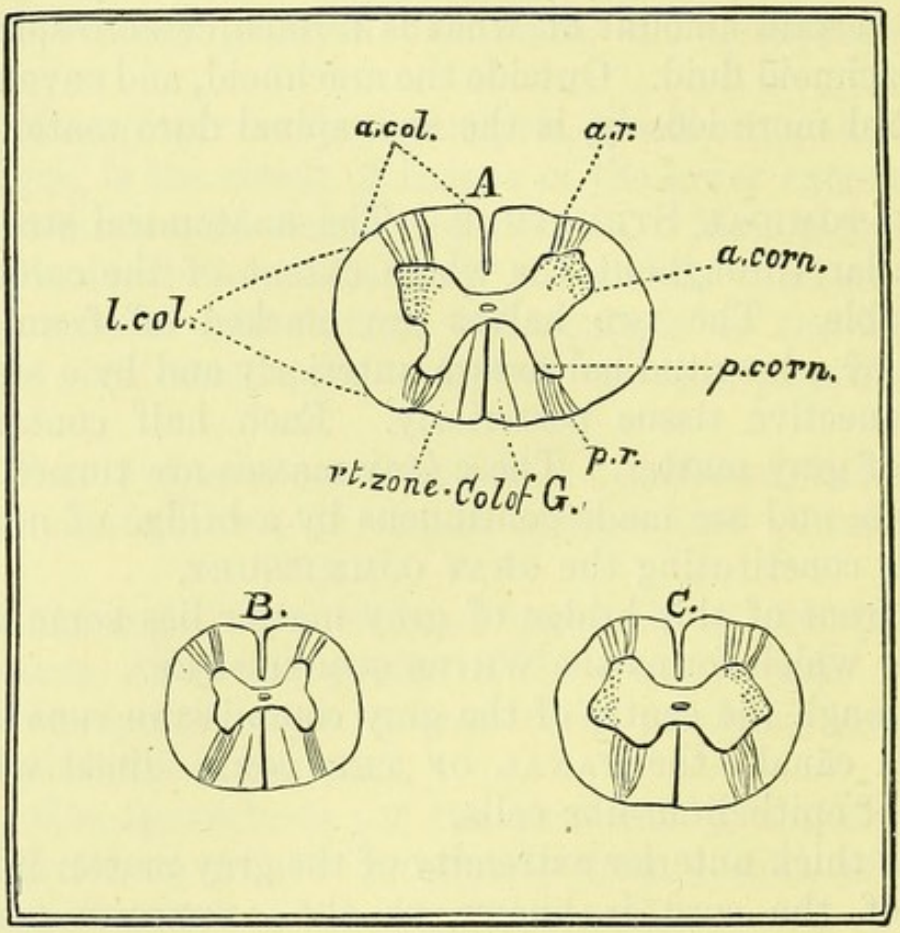


Fig. 19.

TRANSVERSE SECTIONS OF SPINAL CORD (1½ natural size).[1]

A, Through middle of cervical swelling; *a. col.*, anterior column; *l. col.*, lateral column; *rt. zone*, root zone; *col. of G.*, column of Goll; *a. r.*, anterior roots; *p. r.*, posterior roots; *a. corn.*, anterior cornu; *p. corn.*, posterior cornu. *B*, Section through mid-dorsal region. *C*, Section through middle of lumbar region. (Bastian.)

cornua in a diffuse manner, and do not form a compact bundle like that formed by the fibres of each posterior root.

BLOOD SUPPLY OF THE SPINAL CORD.—The principal arteries of the spinal cord are either direct offshoots from

[1] This diagram represents the anatomical structure of the spinal cord as explained in the text.

the vertebral (anterior spinal) or indirect branches from the same artery (posterior spinal)—the latter arising from the inferior cerebellar, which are twigs from the termination of the basilar artery. Apart from these vessels, the blood-supply of the cord comes from still smaller twigs, derived from the intercostal and lumbar artéries, which anastomose with and reinforce the anterior and posterior vessels at intervals, along the whole length of the cord.

A peculiarly tortuous network of veins surrounds the spinal cord on all sides, and there is a natural slowness of the blood-current which is aided by many causes, bearing upon cardiac and respiratory action, as deep emotions or efforts, or distinct diseases of the respiratory or cardiac systems.

From the anatomy of the spinal cord thus described the question may be asked, Which of these parts act in conducting impressions to or from the brain?

The answer to this is, broadly speaking, ANTERIOR-MOTOR, POSTERIOR-SENSORY,—anatomical facts easily remembered by the statement that the letter "s" occurs in the word *posterior* but not in *anterior*.

Impressions of touch, temperature, pressure, and tickling are conveyed to the brain by the posterior columns.

The path of impression from muscles to the cerebrum is also found in the posterior columns, so also are carried to the brain the impressions from the genital centres in the lumbar region.

It is said that, although impressions from the sexual organs, the perinæum, and anal regions are carried up by the posterior columns, yet other impressions from the lower extremities are conveyed by the lateral instead of the posterior columns.

The outgoing channels of conduction from the brain to muscles below the decussation of the pyramids are found chiefly in the posterior part of the lateral columns. The fibres descend through these columns to different levels, according as these stimuli are destined to evoke the activity of different nerves and muscles.

Thus, to excite movements in arms or legs, motor fibres penetrate the gray matter (anterior horns) of the cervical enlargement in the former case, of the lumbar swelling in the latter. They now come into relation with some of the great nerve-cells contained therein, whence outgoing fibres arise and constitute the fibres of the anterior roots.

We can now understand what are termed SPINAL REFLEXES. These are divided into (*a*) the superficial or skin reflexes; (*b*) the deep so-called tendon reflexes.

Dr. Gower's tables well illustrate the skin reflexes, and they are now given in his words :—

Name of Reflex.	Mode of Excitation.	Nature of Result.	Level of Cord on which Reflex depends.
PLANTAR REFLEX . .	Tickling sole of foot.	Movements of toes ; of these and foot ; or of these and leg.	1st, 2d, and 3d sacral nerves.
GLUTEAL REFLEX . .	Irritation of skin of buttock.	Contraction of glutei.	4th and 5th lumbar nerves.
CREMASTERIC REFLEX .	Irritation of skin of upper and inner part of thigh.	Drawing up of testicle.	1st and 2d lumbar nerves.
ABDOMINAL REFLEX .	Irritation of skin of abdomen along edge of ribs, and above Poupart's ligament.	Contraction of upper or of lower part of abdominal muscles.	8th to 12th dorsal nerves.
EPIGASTRIC REFLEX .	Stroking side of chest over 6th and 5th intercostal spaces.	A dimpling of corresponding side of epigastric region (contraction of highest fibres of rectus abdominis).	4th to 6th or 7th dorsal nerves.
SCAPULAR REFLEX .	Irritation of skin in interscapular region.	Contraction of posterior axillary fold (teres), or of several of scapular muscles.	6th or 7th cervical to 2d or 3d dorsal nerves.

B. Tendon Reflexes.—These are two in number, ankle-clonus and patellar tendon reflex (knee reflex, or knee jerk).

If a smart tap is made over the patellar tendon in health, when the leg lies loosely over the side of the bed, the leg and foot are involuntarily raised. In some diseases, notably locomotor ataxy, the tap over the same region elicits no response, the leg and foot being quiescent; and hence there is a broad inference that disease is present, that the link of communication does not exist in its entirety.

Absence or presence of patellar tendon reflex is an important feature in diagnosis of nervous diseases involving the spinal cord.

Ankle-clonus is not a feature of health, and its presence betokens disease.

A tabular statement of these two reflexes is thus given :—

Name of Reflex.	Mode of Excitation.	Nature of Result.	Level of Cord on which Reflex depends.
KNEE JERK, or PATELLAR TENDON REFLEX	By striking patellar tendon with edge of hand, or with percussion hammer, while leg hangs loosely over fellow, or over fore-arm of operator; also by striking quadriceps tendon above patella.	A single upward jerk of leg or foot, slight or distinct.	2d and 3d lumbar nerves.
ANKLE-CLONUS.	With knee extended or very slightly flexed, by pressing firmly and quickly against anterior part of sole of foot (so as to stretch calf-muscles), and then keeping up the pressure.	A series of clonic contractions in the ankle-joint, continuing as long as the pressure is maintained, and instantly ceasing when it is relaxed. If the condition is very highly marked it may spread to the whole limb, or even to that of the opposite side.	1st to 3d sacral nerves.

Brown-Séquard first described, in 1858, ankle-clonus, and it was more particularly defined by Charcot and Vulpian in 1866.

In 1874, Westphal and Erb almost simultaneously described tendon reflex as it existed in health, and drew attention to the significance of its absence in the diagnosis of locomotor ataxy, in which the posterior columns of the spinal cord are diseased.

Disturbances of Nutrition.—By disturbances of nutrition are understood alterations in the trophic relations between different tissues and different parts of the spinal cord. We shall briefly refer to these.

In the Skin.—Irritation of the posterior cornua or of the posterior roots of the spinal nerves may give rise to various pustular and vesicular eruptions in related portions of the skin, and the inflammation is often associated with neuralgic pains in the same region. A striking instance is herpes zoster or shingles, which usually follows on neuralgic pains in the line of the distribution of the intercostal nerves.

In other cases, with lesions in some parts of the gray matter, more grave nutritive disturbances may ensue. Thus, acute sacral bed-sore in acute central inflammation of the cord (myelitis) may ensue, or the same issue may follow certain cases of cerebral hæmorrhage.

In Muscles.—Degeneration or destruction in any way of the great ganglion-cells of the anterior cornua or of the anterior roots of the spinal nerves, may give rise in two or three weeks to atrophy of the muscle-fibres with which such cells or nerve-roots are in relation. We thus have atrophic paralysis associated with the electrical reaction of degeneration (p. 432). Thus the deltoid muscle may waste after dislocation of the shoulder and stretching and injury of the circumflex nerve; or, when there is disease of the anterior cornua of the cord, progressive muscular atrophy and infantile paralysis may follow.

DISEASES OF JOINTS.—Certain diseases affecting the cord are also apt to be associated with chronic diseases of joints. These diseases affect ill-defined sites in the cord, and they are sometimes comparatively unimportant. At other times they may lead, as in some advanced cases of locomotor ataxy, to great atrophy of the articular ends of the bones, and possibly to dislocation and utter destruction of joints. Atrophy and brittleness of bones may also be met with.

PERIPHERAL NERVES.—If a nerve is injured or badly lacerated, changes follow in the afferent and efferent fibres on the distal side of the injury. The medullary substance coagulates and breaks up into drops, and is finally absorbed; the axis cylinders are also destroyed, and the nuclei of the neurilemma proliferate and harden into connective tissue—a condition of matters termed SCLEROSIS.

SECONDARY NERVOUS DEGENERATION. — This is alluded to more particularly under sclerosis, and means a state of hardness, induration, or toughness of the connective tissue (neuroglia) of the brain or spinal cord. Thus, if the motor tract be interrupted by disease or injury at any part, descending degeneration ensues; or, if the sensory tract be involved, ascending degeneration follows from the seat of interruption.

DISTURBANCES OF SENSATION.—By ANÆSTHESIA or SENSORY PARALYSIS we understand the diminution or complete suppression of the conduction of stimuli to the mind through the centripetal (sensory) nerves. Anæsthesia includes paralysis of the sensory nerves of the skin, cutaneous anæsthesia; paralysis of the sensory muscular nerves proper and of all sensory nerve fibres which belong to motion, muscular anæsthesia; sensory paralysis of the nerves supplying the viscera, visceral anæsthesia; paralysis of the nerves of special sense, sensual anæsthesia.

By hyperæsthesia we understand an opposite condition, *i.e.* heightened irritability of the nerve centres, so that

the slightest sound may irritate, the gentlest touch may cause pain, and bright light occasion suffering. This condition is acutely observed as regards sound and touch in hydrophobia, and as regards light in cerebral meningitis.

Dysæsthesia (δύς, with difficulty; αἰσθάνομαι, to perceive) implies impairment of any of the senses, but especially that of touch, and includes tingling and numbness.

General Anæsthesia.—We understand by this complete loss of sensation, a condition observed in the last stage of general paralysis of the insane. Hemianæsthesia consists in loss of sensation in one half of the body, and when associated with motor paralysis (hemiplegia) is dependent on a lesion of the brain.

Disturbances of Motion.—The essence of these disorders consists in disturbances of the function of those centrifugal nerve paths which are regarded as motor, and of the central and peripheral terminal apparatus connected with them. Voluntary, automatic, and reflex movements may thus be partially or completely lost. Further disturbances of motility may be of two kinds—(*a*) Exaltation of motor phenomena, as spasm; or (*b*) Diminution of motor phenomena which may proceed to their complete extinction, as paralysis. The most general division that can be made of spasm is into tonic and clonic spasms. By the term Tonic Spasms are understood persistent and almost equable muscular contractions of great intensity, lasting for a considerable period (minutes, hours, or days), by which the limbs are kept in a state of rigidity. By the term Clonic Spasms are understood rapid successions of contractions and relaxations of the muscles by means of which different parts of the body are often kept in a state of continual and frequently very lively movement—these movements, however, being separated from one another by intervals of sufficient duration for each excitation to be separately recognised. Among tonic and clonic spasms there are several well-defined forms which may be briefly mentioned. The mildest form of clonic

spasm is TREMOR or QUIVERING, consisting of movements successive in character but of limited intensity and range. They may be the result of old age, or paralysis agitans; or they may be associated with certain poisons, as lead, mercury, or alcohol. Higher and more extensive forms of spasms are CONVULSIONS, which we recognise by energetic contractions at short intervals in particular groups of muscles, as twitchings of the face, movements of the head or body, startings of the eyes. If these convulsions affect the majority of the muscles, and occur in rapid succession in different parts leading to extensive movements of the head and limbs, then they are termed GENERAL CONVULSIONS; they constitute the principal symptoms in epilepsy and uræmia. The simplest form of tonic spasm is CRAMP, evidenced by a persistent violent painful contraction of some single muscle, or group of muscles, as cramp of the calf of the leg, or of the muscles of mastication (trismus). A peculiar form of spasm is seen in catalepsy: here certain muscles, or groups of muscles, remain immovable in a condition of moderate contraction, over which contraction the will has hardly any influence, but which can be overcome with some ease by passive movements.

CONTRACTURE.—This term indicates persistent and irremovable shortening, which lasts for weeks or years, and is frequently associated with certain trophic derangements of the muscles; this condition usually affects groups of muscles, as the flexors or extensors of particular joints. Spasmodic, uncertain, purposeless movements which may occur on the simple desire to make a movement, and which also accompany movements performed voluntarily, are characteristic of chorea.

ELECTRICITY

Since the discovery by Galvani of the physical effect of an electrical current on the muscular system, electricity as a curative agent has been more and more recognised, until now no physician's armamentarium is complete without the

means of applying it. A knowledge of the principles on which it is based, and its application especially to nervous diseases, therefore form a fitting introduction to the consideration of the individual diseases ranked as nervous.

Electricity manifests itself in two distinct forms—STATIC and DYNAMIC. Static electricity may be produced by rubbing a piece of amber with flannel, and this principle is applied to complicated machines now rarely used. This form of electricity occupied formerly a prominent place in therapeutics, but now it is seldom employed. Yet in hysterical cases it is said to be of considerable value, and we shall allude to the method of using it, as this brings clearly out the relations of Static and Dynamic electricity.

The method of application consists in placing the patient on an insulated table. A conductor from either pole is laid from the machine to the patient, who is then said to become charged with this form of electricity. It can be discharged from the patient at any part of the body by simply making a connection with the earth. The simplest way is to place one end of a small brass chain over a particular part, and let the other drop to the earth. Another method is for the operator to take an insulated rod to prevent the electricity passing from the patient to the operator, and by tapping the patient in any desired part, the electricity is discharged from it. It will be seen that the conditions known as Static and Dynamic pass into each other, because this agent would be considered in the Static form as long as it remains in the patient's body, but the moment it is discharged it is in motion, and so becomes Dynamic electricity.

Dynamic electricity may be produced by (1) batteries; (2) by means of the dynamo; (3) by means of the thermopyle. When used in these forms it is spoken of as a *constant*, *continuous*, or *galvanic* current. If the current be made and broken it is spoken of as the *interrupted* or *faradic* current. The term *induced* electricity means the placing a wire or coil of wire in the line of the magnetic force of another current. A current

is induced in the second circuit on making or breaking the first circuit, although there is no actual contact between the first and second. Hence most magnetic machines have what are called primary and secondary coils.

Any of the generators mentioned may be used for the constant or the interrupted apparatus, but for medical purposes as a rule batteries are used.

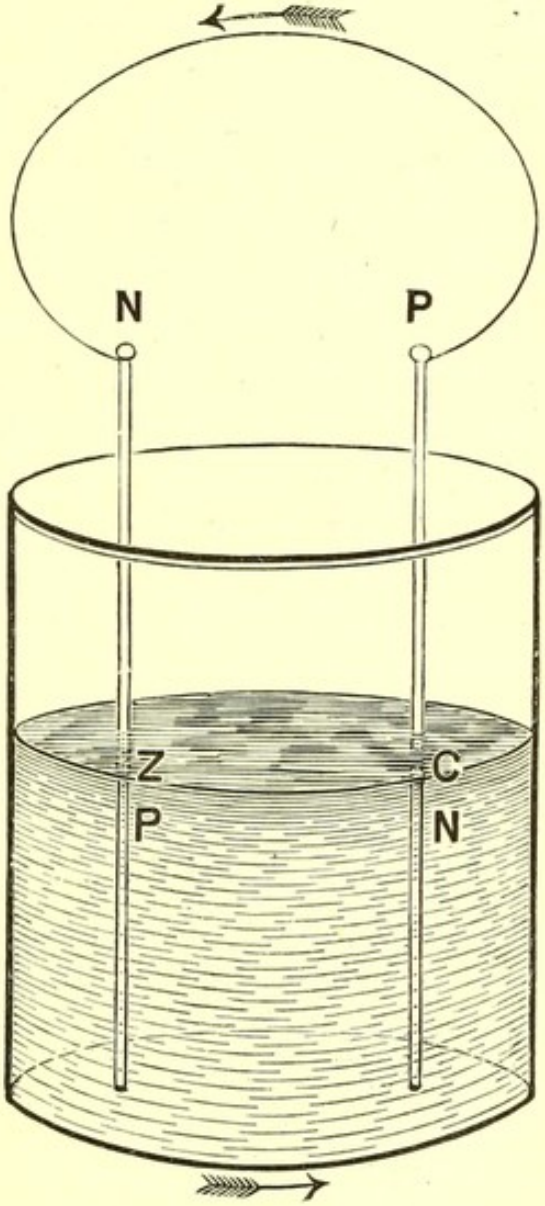


Fig. 20.

The production of a galvanic current is dependent on the action which takes place between two plates of different metals. If two plates—one of copper, the other of zinc—are immersed in acidulated water, no action will be observed; but if a connection be made with the parts which are out of the liquid, as with a wire, bubbles of gas (hydrogen) will be seen to collect on the part of the copper plate immersed, and the wire can be shown by suitable tests to have an ELECTRICAL CURRENT flowing through it. Such a combination is termed a GALVANIC CELL, and a number of these would form a BATTERY. The two plates are the ELEMENTS, and the parts to which the wires are attached are the POLES of the battery. The zinc is termed the POSITIVE ELEMENT but NEGATIVE POLE, the copper the NEGATIVE ELEMENT and POSITIVE POLE.

Whatever form of constant current be employed, it is essential that the three factors now in common use should

be clearly understood. These are (1) electro-motive force, written E.M.F.; (2) current, written C.; and resistance, written R. To bring clearly before the mind the conception embodied in these terms we may compare it with the flow of water through a pipe. Given a tank of water and a pipe leading from it to a lower level, the water flows down the pipe because the pressure above any point is greater than at any point below. The pressure is at its maximum at the inlet and falls to zero at the outlet. Further, a certain quantity of water flows per minute, depending upon the friction and upon the flow of water in the pipe. Three ideas from this illustration are conveyed—*firstly*, the pressure producing the flow; *secondly*, the rate of the flow or current; *thirdly*, the friction or resistance opposing the current.

To compare these with the electrical phenomena, the E.M.F. is likened to the aqua-motive force or water pressure or gravitation. The current is comparable with the rate of the flow and the friction to the resistance which all bodies more or less offer to the passage of the current.

The continuous current battery ought to be provided with some arrangement such as a *dial collector*, by which additional cells may be gradually added to the circuit, and a *commutator* or mechanical arrangement for reversing the direction of the current. A *galvanometer* or *measurer* is also necessary in order to gauge the strength of the current. It may either be attached to the battery or independent of it, but included in the circuit. This measurement of currents is an important and recent change in the application of electricity, for previous to its adoption it was customary to speak of the number of cells employed. As the current from these varies from second to second, it will be readily seen that it was a very unreliable method.

Whatever the source of electricity may be, it should be measured in *ampères* or fractions of ampères, and for medical purposes the galvanometer should range from 1 to 30 milliampères. Edleman's apparatus can be recommended. Apostoli's method of treatment requires a

special form registered to 300 milliampères, and he recommends Gaiffe's.

The E.M.F. has for its unit the volt. The current is measured in ampères or fractions of an ampère (say milliampères), and the resistance is measured in ohms. The relation between the various units was first worked out by Dr. Ohm, and he formulated the law $C. = \frac{E.M.F.}{R.}$, and as there is a resistance inside the battery as well as in the wires forming the outer circuit, the law is further amplified into $C. = \frac{E.M.F.}{R' + R''}$.

Understanding this formula, we can easily name the current required for any work in practice. We can understand if we wish to stimulate a nerve or muscle, say in the arm, by passing a constant current through the tissues of the body, as from the hand to the side of the neck; then it is evident the force we wish to have at our disposal must be such as to overcome the great resistance of the human body between these points. In other words, we require a high E.M.F., possibly thirty or forty volts, but a very small current, thus a fraction of an ampère is only necessary. If we wish to heat a piece of platinum for a cautery point or snare, the small piece of platinum offers little or no resistance to the current, and so a low E.M.F., say four volts, is all that is necessary; but, on the other hand, to gain the necessary heat we may require as many as thirty ampères of current.

The following table may be useful in choosing a battery, and any one by its use can let an electrician understand what is wanted, and the choice of the means of producing the current becomes only a matter of convenience and expense. But with reference to this we may say that at present Lelanche, Paniel, or some form of the bichromate of potash batteries, are employed in medical practice and the treatment of uterine fibroids. In surgery, for lighting or heating, bichromate of potash batteries with large elements are used, or, still better, secondary batteries, which are more convenient and reliable.

TABLE OF CURRENTS WHICH MAY BE REQUIRED IN THE DIAGNOSIS AND TREATMENT OF AFFECTIONS, SURGICAL AND MEDICAL (Macintyre).

	E.M.F.	CURRENT.
Diagnosis and treatment of lesions of nerves and muscles	1–60 volts	1–20 milliampères
Removal of nævi, cysts, etc. .	20–40 „	1–30 „
Uterine fibroids (Apostoli) .	20–40 „	250 „
Lighting of cavities . .	5–20 „	1–3 ampères
Heating cautery points, loops, etc.	5 „	20 „

Every battery should be provided with a *rheostat*—an arrangement for regulating the current by introducing into, or removing from, the circuit more or less resistance.

No practical method has yet been devised for measuring the interrupted current. We must therefore compare contractions produced by its agency with those produced in a corresponding muscle in a healthy subject. Experience gained in this way from the habit of making electrical examinations will teach an operator what corresponding current ought to produce a contraction in any particular muscle that has to be tested.

The best forms of faradic batteries now in use are those in which the inducing current is obtained from one or two galvanic cells. For testing the contractile property of muscle, the primary coil is the better, as the secondary produces a current of higher tension, and is therefore more painful; but the secondary current is to be preferred for testing electro-sensibility.

For the use of both batteries, continuous and inter-

rupted, it is necessary to have *rheophores* or conducting cords from the battery to the patient. At the ends of the *rheophores*, for the purpose of applying the current to the patient, it is necessary to have instruments of various sizes and shapes called *electrodes*. The size employed should always be registered. Erb has standard sets, and it is convenient to make use of these, as they are generally used and the numbers understood.

The limbs to be examined and compared should be placed in the same position, and if it be desired to ascertain the condition of the muscles, the skin over them should be moistened with salt and water. At certain points Ducherine found that muscles could be more easily excited. These points were afterwards proved to be the positions where the motor nerves entered the muscles, or for deep muscles, where the supplying nerve approached nearest the skin, and could therefore be more easily excited. These positions are now called the "motor points."

For the continuous current a pad forming one electrode should be placed on an indifferent part of the body, and the other electrode, applied to the muscle the condition of which it is necessary to ascertain, should be made alternately negative and positive by means of a commutator and the contractions produced compared. Then the contractions produced on the affected limb should be compared with those produced on the healthy side; or if both limbs be affected, "a current registering 2 milliampères ought to produce a contraction."

In examining for faradic contractility the usual way is to apply one electrode to the trunk of a nerve, and the other to the individual muscles supplied by the branches of that nerve.

In testing the electro-sensibility of a part, one moist electrode should be placed on an indifferent part of the body, and the other, a dry one, such as a metallic brush, applied lightly to the part to be tested, the skin also being allowed to remain dry.

The chief use of electricity in diagnosis is to aid in distinguishing cerebral from spinal or peripheral lesions,

but previous to entering upon this it is necessary to understand fully certain symbols in connection with the constant current. Further, to make this very clear we have introduced a woodcut which, elementary though it be, will be of use to the reader.

THE CURRENT FROM A CONSTANT-CURRENT BATTERY ALWAYS FLOWS FROM THE POSITIVE TO THE NEGATIVE POLE — that is, FROM THE ZINC TO THE COPPER WITHIN THE LIQUID, AND FROM THE COPPER TO THE ZINC WITHOUT. It is called a *descending current* when the positive pole is made the indifferent electrode (see p. 431). When the polarity of the electrodes is reversed for the purposes of diagnosis it is assumed that the current flows in a reverse direction, and it is then called an *ascending current.* Faraday called the positive pole the ANODE and the negative the CATHODE. In the reactions of healthy muscle to the continuous current a stronger contraction is produced on closing a descending current than on closing an ascending current; or, in other words, a stronger reaction is produced in a muscle when the electrode applied to it is negative than when it is positive, *i.e.* a cathodal closure contraction is stronger than an anodal closure contraction. This is expressed by the formula C.C.C. > A.C.C.

The reverse of this reaction occurs in "the reaction of degeneration," Erb's definition of which is "*a diminution and loss of faradic excitability in both nerves and muscles, while the galvanic excitability of the latter remains unimpaired, is sometimes notably increased and always undergoes definite qualitative modifications.*"

The normal polar reactions of nerves occur in the following order:—

C.C.C. Cathodal closure contraction.
A.O.C. Anodal opening contraction.
A.C.C. Anodal closure contraction.
C.O.C. Cathodal opening contraction.

The chief practical fact worthy to be noted is that in health the C.C.C. exceeds the A.C.C., and the A.O.C. the C.O.C.

In the early stages of some paralyses the galvanic irritability is very often increased.

The interrupted current in electro-diagnosis is of as great use as the constant. When interruption takes place more frequently than ten times in a second, tonic contraction of healthy muscle is produced, provided a current of sufficient strength be used. When the motor cells at the origin of the nerves, or the nerves themselves, anywhere in the course of their distribution are impaired or destroyed, the contractility of the muscles they supply is either modified or lost.

We are now in a position to understand how electricity may assist in a diagnosis of central from peripheral paralysis.

A paralysis is central so long as that portion of the nerve-centres with which the paralysed nerve is in communication remains healthy, the lesion being higher up in the cerebro-spinal axis.

Such a condition is revealed by the three following tests :—

1. Reflex stimulation of the muscles is possible.
2. The muscles undergo little wasting.
3. The irritability of the muscles to faradism is little altered, in fact hardly diminished.

But if, on the contrary, we find the muscles cut off from communication with their nerve-centres, or communicating DIRECTLY with centres which have been sapped by disease, then we understand that peripheral, not central, paralysis exists.

The two leading signs of this condition of matters are—

1. The muscles waste very rapidly.
2. Their irritability to faradism is greatly diminished, if not destroyed.

These quantitative and qualitative changes in the action of muscles appear to depend upon degeneration, and are spoken of as THE REACTION OF DEGENERATION, the definition of which was given previously. This degeneration is found in some forms of paralysis due to degenera-

tive changes in the cord; in spinal paralysis both of infants and adults; in traumatic paralysis due to injury of a nerve trunk; in rheumatic paralysis due to thickening of the neurilemma; and in lead-paralysis.

We now come to ask the important question, To what use can electricity be applied in the treatment of disease? Avoiding exaggerated statements on this subject, easily made and difficult to disprove, we may justly state that attempts to remove the cause of the paralysis by influencing the nutrition of the parts where such cause is situated are worthy of trial, and they should consist in acting on the sympathetic nerve-fibres supplying the blood-vessels of the part.

Thus a clot in the brain, caused by cerebral hæmorrhage, and evidenced by an apoplectic seizure, may be hastened in its absorption by stimulating the nutrition of the damaged brain-substance through the cervical sympathetic nerve. This influence is accomplished by placing one electrode over the superior cervical ganglion (which may be reached by pressing inwards at the angle of the jaw), and the other on the back of the neck over the first and second cervical vertebræ.

It is to be carefully noted that such electric treatment should not be attempted until all danger of irritation is gone, certainly not before three weeks from the original paralytic seizure.

The application of the electric current to paralytic muscles is of service, and is based upon the reasonable supposition that we wish to keep the paralysed muscles in a fairly healthy, well-nourished condition, so that if the central lesion ever becomes the seat of activity and health, the brain will have no trouble in evincing its power. The treatment itself must be by that current to which the muscles most readily respond. If the induced, then the induced current; if the continuous, then the continuous or constant current. Always employ the weakest current possible, so as to refresh, not fatigue, the muscles. Repeat the application every other night and operate systematically on each muscle implicated.

In certain conditions, on the other hand, of paralysis, electricity can be of no use. What are these conditions? If the paralysis to the will remain absolute, and if the contractility of the muscles be perfect, we do no good by electric treatment. This condition is often seen in hemiplegia.

If the irritability to both forms of current has completely disappeared, it ill behoves us to hold out imaginary hopes of recovery to the patient. Such conduct is unjust.

If paralysis to the will remain absolute, and if the irritability of the muscles be diminished, electricity is useful, in so far as it helps to improve the nutrition of the muscles and restore their normal degree of irritability. The normal degree of nutrition and irritability being restored, electrical treatment may be discontinued.

Electricity is also useful in painful affections. The galvanic current is found best for these, and the positive pole, according to some authorities, ought to be placed on the painful spot. Thus neuralgia of any type may be relieved, especially neuralgic headaches; and lumbago, sciatica, and painful rheumatic conditions may be alleviated, if not absolutely cured.

Electricity is also employed, and successfully, in spasmodic diseases. Tremor and writer's cramp may be relieved by it. Tonic spasm of internal organs, such as the bowels and bladder, may yield to the galvanic current. In other diseases, when the nervous origin is not so apparent, well-directed electricity may do good. Thus, the pain of angina pectoris and herpes zoster may be assuaged. Even skin diseases of an obstinate character may be benefited. In rheumatic gout it may be beneficial —one pole being applied to the epigastrium, the other to the diseased member.

Ovarian tenderness and amenorrhœa have disappeared under its influence, and Apostili's treatment of uterine tumours has gained adherents in this country.

The last application of electricity in therapeutics may now be alluded to, viz. the galvano-cautery and galvano-

puncture. Cauteries may be heated by electricity, and, when so heated, they may be used to destroy diseased masses, or to disperse tumours; while the absorption of hydatid cysts of the liver has been hastened by the galvano-puncture.

The galvano-puncture is now a recognised method of treating aortic aneurysm, and the operation seems to be without danger or pain. The application is easy. The current should be generated by small cells of low electromotive power (Smee's cells modified by Foveaux seem the best). Each pole should terminate in a fine needle carefully insulated except at the point. Both needles should be thrust quickly and boldly into the sac, care being taken that they are separated in the sac by an inch of space or more.

The effect of the current is to cause a firm coagulum round the positive pole, while the liberation of gas at the negative pole causes there a soft frothy coagulum. A current of ten to twelve cells can be borne for an hour or more. When the needles are carefully withdrawn, the orifices left in the skin must be closed by collodion.

The operation may be repeated at a suitable interval, and consolidation of the aneurysmal sac is sometimes the fortunate result. Twice in my hospital experience this was observed.

GENERAL THERAPEUTICS OF THE NERVOUS SYSTEM

Having thus discussed electricity, we will make a few remarks upon the general therapeutics of the nervous system. There is no doubt that great difference of opinion exists as to treatment in nervous diseases, yet there are some broad remedial measures which time and experience have established as the best.

Means which increase the blood supply.—(1) Posture. The patient is placed on his back, his feet and limbs are raised, his head kept low, and the result is more blood is

sent to the brain. (2) Compression of arteries is sometimes, though rarely, resorted to, as tourniquets to the femoral and compression to the carotid arteries. (3) Stimulants. Alcohol, ammonia, food. (4) Paralysing the vaso-motor nerves. Special benefit is derived from inhaling nitrite of amyl.

Means which decrease the blood supply.—(1) Venesection. Now rarely used, yet, without doubt, an admirable and safe remedy in plethoric cases. Leeches and cupping counter-irritate and diminish the blood-supply. (2) Position. Placing the patient on his face decreases the circulation in the spinal cord. In extreme cases of insomnia, sleep may be obtained in the sitting posture. (3) Continuous cold. The application to the scalp and spine of pounded ice in a bladder is useful in cerebro-spinal meningitis and spinal inflammation. (4) Galvanism stimulates the vaso-motor nerves and produces anæmia; so also do ergot and belladonna. (5) Mental rest, light literature, pleasant conversation, and sweet music, are important addenda to general treatment in diminishing the cerebro-spinal blood supply.

Cerebral Excitants.—Alcohol, cannabis indica, opium in small doses, and belladonna.

Spinal Excitants.—Nux vomica or strychnine, and Easton's syrup, when there is not inflammation but nervous exhaustion, as in some cases of epilepsy and spinal irritation. Quinine is, to a certain extent, a cerebral excitant; and cantharides stimulate the lower part of the spinal cord in inertia of the bladder or genital organs.

Cerebral Depressants.—Cold and bromide of potassium occupy the chief place, the bromide being very valuable in sleeplessness and all forms of cerebral excitement. It is supposed to act by depressing the cerebral circulation and producing temporary anæmia of the brain. Hydrate of chloral cautiously given up to gr. xxx. either alone or with bromide, is valuable in insanity, but more recent hypnotics, as paraldehyde, sulphonal, and chloralamid, are justly superseding chloral. Opium, or the salts

of morphine, either internally, or by suppositories, or hypodermically, are useful, unless there is an idiosyncrasy contraindicating their employment, as in the case of some females.

Spinal Depressants.—Succus conii, ℥ss to ℥i daily, is the most valuable preparation. Bromide of potassium and chloral also are of great service in various diseases; and in poisoning by strychnine, chloral is an undoubted specific.

Tonics and Restoratives.—Preparations of phosphorus and zinc occupy the foremost place as tonics and restoratives in nervous diseases. Next come fatty food and strychnia, arsenic, iron, quinine, and sea-bathing; while cold baths are useful if the reaction of the skin is good and no chill follows their employment.

Arsenic is specially serviceable in chorea. Quinine acts to some extent directly on the nervous centre; iron, indirectly, by raising the general tone and nutrition of the system. Constitutional syphilis with nervous phenomena is best treated by iodide of potassium with small doses of perchloride of mercury. Malarial neuralgia is checked by the hypodermic injection of quinine over the affected nerve (F. 11*d*).

Counter-Irritants.—Blisters, dry cupping, sulphur baths, and, within certain limits, faradic and galvanic electricity, are the means chiefly adopted as counter-irritants. The actual cautery and setons have fallen into disuse.

Massage.—Under this term certain distinct methods of manipulation are embraced, which we shall now briefly explain, premising that all the methods are done with the dry hand without the aid of oil or liniments:—

(*a*) *Effleurage.* The part is stroked with the palm of the hand in an upward or centripetal direction. The stroking must be regular and according to circumstances more or less quick. (*b*) *Petrissage.* A portion of the muscle is picked up with the fingers and thumb of one or both hands; it is subjected to firm pressure and rolled between the fingers and subjacent tissues. Working from

periphery to centre successive portions are taken up one after another. (*c*) *Friction.* Rubbing the surface of a limb with the tips of the fingers. (*d*) *Tapotement.* Percussion with the tips of the fingers, the palmar surface of the tips, the palms of the hands, the back of the half-closed hand, the ulnar or radial border of the hand, or the whole hand, so as to enclose some air between it and the surface of the limb.

The duration of massage should be from ten to fifteen minutes on any one occasion, and in recent cases the sittings may be three or four in the day. While no mystery surrounds the process, yet the masseur requires to have soft yet firm hands, and good conversational powers. As carried out at Aix-les-Bains or Bath, it is materially aided by the use of the waters at these spas.

Method of Diet.—The diet must be strengthening, yet not stimulating. Milk, meat, eggs, light vegetables, puddings, and fluids are allowed and required; an abundant supply of fatty nutriment (butter, cream, cod-liver oil) is perhaps useful in a good many cases; strong seasoning and heavy dishes must always be avoided. A glass of wine or beer with food is in most cases advisable, but their excessive use is strictly forbidden. Strong tea and coffee must be avoided, while smoking in moderation is allowed.

Mode of Life.—In conditions of hyperæmia and inflammation, Brown-Séquard directs the avoidance of lying on the back as much as possible. A moderate amount of exercise without fatigue is useful and desirable, but let the patient be warned against every excess of exertion, notably to cease walking when fatigue is felt. In all cases it is well to limit sexual indulgence, and in many to forbid it wholly. To secure sleep is an essential point, and in connection with this all exciting reading or conversation must be forbidden, especially in the evening. The clothing should be warm, to avoid catching cold. Hardening the system may be accomplished by sponging the body with cold water, while the feet stand in warm water.

DISEASES OF THE NERVES

NEURITIS.—Inflammation of the nerves or neuritis may arise from direct injury, as blows, fractures, wounds; or from inflammation of neighbouring parts, extending so as to involve them, as from suppurating wounds; from certain general conditions, as syphilis, gout, rheumatism, chronic alcoholism, lead-poisoning, or as a sequela of enteric fever, small-pox, diphtheria.

The inflammation may be ACUTE or CHRONIC, and affect mainly the connective tissue or the nerve fibres themselves. In *acute* neuritis there is more or less pain in the nerve itself and in the part to which it is distributed. The pain is worse at night, and is increased by movements or positions, which cause stretching or pressure on the nerve. Later on sensation is diminished and the muscles may present twitchings or cramps, at the same time losing power and becoming tender. Ultimately they atrophy and present the "reaction of degeneration." In *chronic* neuritis the pain is not so severe as in the acute form, but changes in sensibility, atrophy of the muscle, degenerative reaction, glossy skin, and other disturbances of nutrition follow.

MULTIPLE OR PERIPHERAL NEURITIS (*disseminated neuritis*).—This affection may arise from various causes, yet the most common one is the prolonged use of alcohol, and hence it has by some been termed chronic alcoholic neuritis. As the result of alcoholism it is much more common in women than men, and occurs mostly at the middle period of life. In the succeeding remarks we shall confine our attention to the form of the disease due to alcohol as seen in a female. The earliest SYMPTOMS are numbness of the fingers and toes, which later spreads up the limbs, and is accompanied by muscular cramps, especially at the calves. After a time—which varies considerably—and if the disease proceeds unchecked, paralysis gradually extends from the extremities upwards.

It affects the extensors more than the flexors of the limbs, so that the patient is unable to extend her hand (drop-wrist) and the toes are pointed as she lies in bed (drop-foot). At an early stage the patellar reflex is lost, and the weakened muscles quickly atrophy, and anæsthesia of the lower limbs, sometimes hyperæsthesia, occurs. The mind is weakened, with loss of memory and delusions, but generally the mental condition is only that of apathetic indifference.

Diagnosis.—The pains and the loss of the patellar reflex simulate locomotor ataxy, but it is distinguished from this disease by its history; by the absence of the Argyll-Robertson pupil, by the non-disturbance of the functions of the bladder and the rectum, and by the dragging, not the raising, of the foot, when walking is attempted; also by electrical reactions.

Prognosis.—In cases detected early, and when the cause can be completely removed, the prognosis is not unfavourable, recovery taking place in the course of two to six months. But if it be not detected early, and if the use of alcohol be continued, then progressive emaciation sets in, and death follows from an intercurrent disease, as phthisis or cirrhosis of the liver.

Treatment.—In *neuritis* it is obviously necessary to remove the cause if possible, and to keep the affected part at rest by proper position, at the same time applying to it hot fomentations. While diaphoretics and salines are useful, yet mercury in small doses is the best remedy. In chronic cases counter-irritation should be applied and a weak galvanic current. In *multiple neuritis* rest must be enjoined, with complete abstinence from alcohol; pains relieved by anodyne liniments; the system sustained by nutritious diet; and the nutrition of the muscles aided by a continuous current and massage.

DISEASES OF THE MOTOR NERVES

Facial Paralysis or Bell's Paralysis — Peripheral Paralysis.—The motor division of the seventh pair—the portio dura or facial nerve—may be affected either at its origin or in its course by lesions which destroy its conducting power, and which are consequently attended with paralysis of the muscles to which it is distributed.

Causes.—The most frequent cause is the direct action of cold upon the side of the face. Next come parotitis, tumours growing from the parotid gland, swellings of the cervical glands, wounds on the cheek, which affect the nerve beyond the aqueductus Fallopii. In its course within the canal it may be involved with scrofulous affections of the petrous bone or by tumours. On the cerebral side of the internal auditory meatus, or at its origin within the pons, it may be affected with morbid processes of various kinds.

Symptoms. — The appearances are characteristic, as there is paralysis of motion, more or less complete, of the muscles supplied by the nerve. Hence the face has a blank, unmeaning expression. The eye of the side affected cannot be closed, tears run over the cheek, the mouth cannot be pursed up to whistle or expand to smile. In accordance with the distribution of the facial nerve, it will be found that if the morbid process originates above the origin of the chorda tympani nerve, there will be a diminution of the sense of taste in the corresponding side of the tongue ; if behind the gangliform enlargement of the petrosal nerves, there will be, in addition to the other symptoms, paralysis of the parts supplied by these —the uvula will be drawn to the sound side, and the palatine arch on affected side will fall down and become straight instead of curved.

By the facts that the tongue is unparalysed and deglutition unimpaired Bell's paralysis is distinguished from glosso-labial paralysis ; and, by the fact that the patient cannot close the eye, from the facial paralysis of hemiplegia.

Diagnosis and Course.—The course of facial paralysis varies according to its cause. If due to a cerebral or intracranial lesion, there is no prospect of a cure. If dependent on a cold it tends in some cases to recovery in from three to ten weeks. Erb has lately pointed out how the application of electricity may aid diagnosis and prognosis in facial paralysis. In the *mild* form, which tends to get well in three weeks, the paralysed side responds to the electric current as readily as the sound one does. In the *severe* form, which includes a large proportion of those cases due to the direct action of cold, there is "the reaction of degeneration." No improvement in such a case can be looked for until two or three months have elapsed; and, even with recovery, which may be in a period of equal duration, there may be permanent weakness and stiffness of the muscles affected. Further, in paralysis of this nerve from central (cerebral) lesion there is no reaction of degeneration.

Treatment.—The persistent use of electricity is of great importance, one pole of the induced current being placed over the point of exit of the nerve, while the other is applied in succession over the various muscles supplied by it. The healthy condition of the system should be secured by hygiene and tonics, especially strychnine. If there is reason to suspect a syphilitic taint, give iodide of potassium and mercury (F. 1).

Paralysis of the Ocular Muscles.—Paralysis of the ocular muscles depends on affections which involve either the peripheral nerves or their nuclei in the brain. The peripheral variety will only be alluded to here, the causes of which are (1) Injuries; (2) Compression of nerves from morbid processes in their neighbourhood, as tumours, periostitis, syphilitic diseases of the nerves and their surroundings, aneurysms of the basilar artery, acute or chronic meningitis; (3) "Rheumatic paralysis," dependent on cold or exposure; (4) Acute diseases, as a result of diphtheria; or chronic diseases, as diabetes mellitus.

Symptoms.—Double vision or diplopia is noticed by the patient, who also may complain of dizziness. In complete paralysis of one oculo-motor nerve the first thing that is observed, besides the disturbance in the movements of the eyes, is more or less drooping of the eyelid (ptosis). The affected eye does not move upward, downward, or inward. The pupil is dilated (mydriasis), and does not contract to light. Distinct vision for near objects is impossible, and accommodation is lost. In old oculo-motor paralysis the eye is turned outward, owing to the contracture of the unparalysed external rectus.

Paralysis of the abducens is characterised by inability to move the external rectus. The eye can no longer be moved outward beyond the median line, and in old paralysis of this kind the eye is drawn inwards (convergent strabismus), owing to the contraction of the internal rectus.

The symptoms of paralysis of the *trochlear* nerve, influencing the superior oblique muscle, are difficult to explain, and are not of much practical importance.

Rheumatic paralysis is acute in its onset, affects the abducens most frequently, is associated with pain in the eye and head, and tends to recovery, as a rule, in a few weeks. The diphtheritic ocular paralysis sets in about ten days after the termination of the disease, and affects the muscles of accommodation, so that near objects are seen indistinctly. The prognosis here is always favourable. The course and prognosis of the other forms depend upon the morbid processes which underlie them.

Treatment.—(1) Mercurial inunction, and iodide of potassium in syphilitic cases. (2) In other cases strychnine subcutaneously in the vicinity of the eye, or a weak galvanic treatment. The acute pain associated with the rheumatic paralysis must, however, have abated before using either of these remedies.

Paralysis may affect the muscles of mastication, individual muscles in the region of the shoulder and back, upper extremity, and in the region of the lower extremity, but

as such affections are rare we do not think it advisable to do more than refer to them. Paralysis of the diaphragm may be seen occasionally in hysteria, or as a "rheumatic" paralysis, and in such cases the prognosis is favourable; but if it follows on other severe nervous diseases a fatal termination rapidly ensues.

DISEASES OF THE SENSORY NERVES

PARALYSIS OF THE FIFTH NERVE (trigeminus).—The principal symptom here is anæsthesia of the face. The anæsthesia may in some cases be traced to the median line of the forehead, nose, and mouth, and hence the patient's attention may be for the first time directed to his ailment when he puts a cup of tea to his lips and only feels half of it. The sense of smell is not lost, but the sense of taste is found absent in the anterior portion of the tongue. A serious and important change also may ensue by foreign bodies lodging in the eye, which set up inflammation, resulting in sloughing of the cornea.

Etiology.—The great majority of cases of paralysis of the fifth nerve are caused by complete destruction of the trunk or of its ganglion, which results from caries or necrosis of bones, syphilitic disease of bones or membranes, cancerous growths or aneurysm of the carotid artery.

Treatment.—The chief remedy is the electric current, treating the anæsthetic portion of the skin with the faradic current, by the employment of the wire brush; or by the galvanic current, stroking the skin slowly with the cathode for three or four minutes. In addition to electricity liniments may be used, as lin. chloroformi, and cold or hot local douches. To protect the eye from external injuries a bandage should be carefully applied.

PARALYSIS OF THE OLFACTORY NERVES. — In this condition there is loss of the sense of smell—ANOSMIA. It may arise from blows on the head, the part struck being generally, if not always, the occiput, or without any

central affection of the olfactory nerves it may be due to thickening of the Schneiderian membrane from chronic catarrh. Sometimes this condition is observed in locomotor ataxy and hysteria.

The centres of smell and taste, according to Ferrier, are under the surfaces of the tempero-sphenoidal lobes; and when injured there is inability to perceive odours. When the lesion arises from central causes, it is associated with loss of taste, so that a patient so afflicted is able to recognise bitter and sweet, sour and salt tastes, yet in all other respects his sense of taste appears to be extinguished. "He cannot tell one kind of meat from another; boiled apples, boiled onions, boiled turnips, all appear the same to him. All kinds of wine seem to have lost their flavour, tasting more like sour or sweetish water, except that they are more or less rough to the palate."

NEURALGIA

Neuralgia, derivatively meaning nerve pain, has long been applied to all disorders in which pain referred to the peripheral nerves has been a prominent symptom. Thus it used to include migraine, but this affection is now justly regarded as a substantive affection. Some also consider sciatica not as a neuralgic affection but as a form of neuritis, but with this conclusion we cannot agree, and we shall therefore, under neuralgia, consider facial neuralgia or tic douloureux and sciatica, and briefly allude to other neuralgic forms. Under a strict systematic arrangement neuralgia should be classed under functional diseases of the nervous system, but from a clinical standpoint we consider it advisable to treat of it after the paralyses motor and sensory. The principal symptom in these affections is *pain*, and the characteristics of neuralgic pain are—(1) Certain "tender points," pressure on which distinctly increases the pain. (2) Limitation, as a rule, to one side of the body, or if not to one side, the pain does not affect both sides with equal severity.

FACIAL NEURALGIA (*Synonym*, Tic Douloureux) is more apt to attack females than males during adult life, and seems frequently to have some connection with menstruation, lactation, mental excitement, or exposure to cold. The pain is sudden, occurring without the slightest warning, while the patient is engaged in reading or any ordinary work. It lasts from ten seconds to a minute, and ceases as abruptly as it began, but the paroxysms may return every few minutes, and generally at a fixed period of the day. It may affect the nerve in any or all of its divisions.

Neuralgia affecting the cervical nerves is termed "cervico-occipital" and "cervico-brachial neuralgia." The great occipital or posterior division of the second spinal nerve in its muscular distribution may be affected with neuralgic pain, due to the direct action of cold. Cervico-brachial neuralgia generally affects several of the branches of the brachial plexus. Painful spots are developed, and the pain present in these is aggravated by muscular movements of the arm. Neuralgiæ of the dorsal and lumbar nerves are rare.

SCIATICA. — It is often associated with a lowered physical stamina, and is due sometimes to such causes as rheumatism, gout, renal calculus, loaded rectum, or locomotor ataxy. The pain, which is very acute, is referred to the course of the sciatic nerve or its branches, sometimes limited to the gluteal region, or proceeding along the nerve to the inside of the thigh. Occasionally the pain may extend to the soles of the feet. Often sciatica prevents movement during the day and sleep at night. Its course varies as to time, but untreated, it may last for two or three months, and if rheumatic in origin, is apt to recur.

Treatment. — Butyl-chloral hydrate, antipyrin, gelsemium or exalgine often alleviate, or give entire freedom from pain in FACIAL NEURALGIA, but their effects are only temporary, and systematic tonic treatment should not be neglected, as in the form of liquor strychninæ

hydrochloratis with liquor arsenicalis hydrochloricus, or a scale preparation of iron. To arrest the paroxysms morphine should be given hypodermically, or a liniment consisting of lin. opii, lin. belladonnæ, and lin. chloroformi may be used (F. 57), or unguent. aconitinæ. Fresh pure air materially aids any medicinal treatment.

In SCIATICA a constitutional disease very often underlies the local affection, and must be appropriately treated. If there be evidence of gout, then give colchicum and iodide of potassium; if of rheumatism, salicylate of sodium; if of malaria, quinine in large doses. When the pain is very severe a daily hypodermic injection of morphine into the tissue of the nerve, or as near as is possible, seems not only palliative but even curative. Cocaine similarly injected in doses of $\frac{1}{8}$ to $\frac{1}{2}$ gr. sometimes affords considerable relief.

In many cases the most effectual treatment is by iodide of potassium when it is given in large doses, from 20 to 120 grains in the day; small doses here of this drug are of no therapeutic value. The iodide treatment is materially aided by the application of a succession of small fly-blisters over the course of the nerve. The Turkish bath in some cases is also very effectual, especially if it be combined with systematic massage, or by hot and cold douches played alternately over the course of the nerve. The induced current, continued for half an hour, is sometimes very beneficial.

Mineral Spas. — Buxton, Bath, Ischl, Teplitz, and Aix-les-Bains.

VASO-MOTOR AND TROPHIC AFFECTIONS

PROGRESSIVE FACIAL HEMIATROPHY.—This extremely rare disease affects chiefly females, and commences before the twenty-fifth year of life.

It is characterised by a chronic loss of substance in one side of the face, generally the left, and begins in the ex-

ternal soft parts and passes to the deeper tissues. On the atrophied side of the face the cutaneous secretion is diminished or wholly arrested. Though the vault of the palate, the soft palate, the uvula, and the tongue on the affected side are diminished in size, yet the functions of taste and smell are not interfered with.

The *course* is slow and protracted, and no permanent arrest to its progress occurs by any mode of treatment.

HEADACHE is a symptom occurring in the course of a great variety of diseases, dependent on very different factors. It is significant of fever. It precedes catarrh, and constitutes a leading diagnostic symptom of acute meningitis, tumour, and abscess of the brain. It generally appears before and invariably follows on an epileptic seizure, and sometimes foretells an attack of cerebral congestion or cerebral hæmorrhage. It may result from the state of the blood in chronic alcoholism, uræmia, secondary syphilis, and diabetes.

These diseases have, however, other easily recognised symptoms, but in migraine it is the leading feature, and before considering it we deem it advisable to treat briefly of other conditions with which migraine may be confounded.

1. Plethoric headache is observed in young, full-blooded unmarried females when there are irregularities in the menstrual functions or temporary suppression of the discharge. It is also complained of by people who live well, and in those who, without great indulgence, rise late in the morning and during the day do not take sufficient exercise. In such cases there is giddiness in stooping or in quickly turning round. The pulse is strong, and there is a constant sense of fulness of the temporal arteries, and often a pulsation in the ear.

2. Bilious headaches are of two kinds—the accidental and habitual. The ACCIDENTAL obviously arises from errors of diet, either in overloading the stomach or in taking some substance which exercises an injurious influence on digestion. Headaches of this character usually

last for twenty-four hours. The HABITUAL headache arises without any recognisable exciting cause. Persons whose digestion is weak are specially liable to suffer from it, and a trifling error of diet or irregularity in taking food will render the system irritable and restless, with a disinclination for mental or physical exertion. Then follow pain or a dull aching of the head (generally the forehead, but sometimes the crown of the head or occiput), and a sense of weight, pain, and stiffness of the eyeballs. Such headaches are often protracted for two or three days, and render the patient unfit for any kind of work.

3. Rheumatic headache is accompanied by heat of the head and superficial tenderness. The pulse is quickened and the tongue white, but the joints are in no way implicated, although there is usually a history of a family predisposition to rheumatism or neuralgia. The headache here often originates from mental worry, sleepless nights, or over-study, and it may follow on the imprudence of standing in a draught when the body is overheated by exercise.

4. Migraine synonyms—megrim, sick headache, sick giddiness, hemiopia, hemicrania. The pain here is often limited to one side of the head. To such cases the name of Hemicrania (*ἡμίκρανια*) has been applied since the days of the old Greek writers, and that word has undergone corruption into the French *migraine* and the English *megrim*. "Evidently one name should be given to all the varieties, and if we can forget its etymology, the word migraine appears to be by far the most suitable for the purpose."

The leading symptom in migraine is pain, which commonly begins at some one spot in the forehead or temple, and gradually spreads all over these regions. It is sometimes preceded by indistinct vision or a tingling sensation in the limbs, face, tongue, or other parts. The pain is more dull and sickening than that of neuralgia, and it is aggravated by every noise heard, by exposure of the eyes to light, and by every movement of the body, especially the head. Thus the great desire of the patient is to be let alone, to lie still in a darkened room and not to

be spoken to. In severe cases even lying down on a bed or sofa or reclining in an easy chair is so intolerable that the patient is obliged to get up and move about. The beats of the heart are in such cases reduced sometimes to fifty-two or even forty-eight per minute. The hands and feet are cold, yet the head feels hot, and while the radial artery is small and contracted, the carotid is full and throbbing. In this distended throbbing carotid we have a clue to the nature of the affection, but the interpretation is twofold.

(*a*) The sensory phenomena are due to an implication of the vaso-motor system of nerves on the affected side, which leads first to contraction of the vessels and anæmia of the brain, and secondly to dilatation and hyperæmia consequent upon exhaustion of the vaso-motor apparatus.

(*b*) The sympathetic disturbances are secondary phenomena, the primary change being a disturbance of the cells of the cerebral cortex, which disturbance is one of continued inhibition and discharge.

The duration of a severe attack is usually several hours. It is often hereditary, and females are more subject to it than males. It rarely commences after thirty, and subsides with the advance of years.

Treatment.—In migraine the patient should be allowed to remain in a darkened room, and not be troubled with anxious inquiries or attentions, which only make the condition worse.

The REMEDIES chiefly used during the attack are tinct. guaranæ m. xxx.; granular effervescent citrate of caffeine gr. xxx.; salicylate of sodium gr. xxx.; antipyrin gr. xx.; tincture of cannabis indica m. x.; bromide of potassium gr. xxx.; nitrite of sodium two parts in 120 of water—dose, a teaspoonful. Strong tea or coffee often gives relief, and pressure on the carotid or temporal artery of the side affected may command for a time the pain.

The GENERAL TREATMENT consists in a change of air by a sea voyage or residence at a high altitude, in the avoidance of all mental worry, and in correcting derangements of digestion.

In the other cases of headache referred to it is essential

to attend to the primæ viæ, and to secure regular motions by appropriate diet or medicine. A useful aperient in slight cases is pulv. rhei co., of which 60 grains may be occasionally taken.

When PLETHORA exists a more active purgative is required, as calomel 4 grains in the evening, followed by a black draught (mist. sennæ co.) in the morning, and afterwards an aromatic tonic (F. 79*a*). The general principles of diet are indicated under Obesity, p. 109.

The *habitual bilious headache* is very difficult to treat satisfactorily, but most reliance is to be placed in the use for some time of podophyllum or euonymin until regularity of the bowels is established, and afterwards prescribing Easton's syrup. The *rheumatic* headache is as a rule controlled by salicylate of sodium during the day and by a hypnotic at night.

EXOPHTHALMIC GOÎTRE (GRAVES'S DISEASE, BASEDOW'S DISEASE)

This affection was first described by Dr. Graves, Dublin, in 1835, and by Dr. Basedow, Germany, in 1840. It occurs much more frequently in women than in men, and mostly between the ages of fifteen and thirty. Usually the history of the case reveals a neurotic tendency, as shown by a family history of hysteria, epilepsy, or mental disease. As a rule the affection sets in gradually, but in some cases it follows rapidly on a severe nervous shock or sudden fright.

Symptoms.—There are three cardinal symptoms, which appear in the following order :—1st, Increased action of the heart, at first occasional, afterwards constant, the number of beats reaching at times 140 in the minute, or even more. 2d, In a month or so afterwards prominence of the eyeballs appears, varying in degree. In some instances merely a staring, glistening expression is observed, in others a wide space is seen between the corneal margin and the edges of the eyelids ; the sight is not much if at

all affected. The prominence is most apparent during the menstrual period and times of excitement. 3d, Swelling of the thyroid body, symmetrical or more marked on one side, usually the right; the size is never so great as in the endemic form of the disease.

Other symptoms supervene, as irritability of temper, tremor, increased temperature, and perspiration; yet the affection is not fatal.

Pathology.—Different explanations are given as to the nature of this peculiar affection. Some consider it simply as an affection of the heart; others attribute its origin to disturbance of the lower cervical ganglia of the sympathetic nerves. Against the first hypothesis is the course and nature of the affection, and against the second is the fact that in two cases where death occurred the cervical ganglia were found healthy. The most feasible explanation is that its original starting point is central from the brain, the spinal cord, or the bulb, and the probability is that its exact site is the bulb, disturbance of which entails a permanent unstable condition of the emotional nervous centres.

Treatment.—Quinine and iron have been recommended alternately, each for three weeks at a time, the quinine in a dose of 5 grains in a day, and iron in the form of pil. ferri 5 to 6 daily. In mild and early cases belladonna has done good. All experience shows that digitalis does not control the excited cardiac action. Locally the weak continuous current, if conducted daily for a considerable length of time, lowers the rate of the pulse from 130 to 70 or 64 beats per minute, and reduces the prominence of the eyeballs.

Dietetic and Climatic Treatment.—A careful regulation of the diet is of special importance; alcoholic drinks, tea and coffee, should be avoided, and the food should be largely composed of milk and vegetables. A life in the country or at a mountain health resort of moderate elevation does good; and mineral springs containing iron, as Franzensbad, Pyrmont, Schwalbach, are sometimes of incontestable value.

DISEASES OF THE SPINAL CORD

Before treating of the different forms of spinal disease, we desire to explain what is termed Paraplegia.

PARAPLEGIA.—Paraplegia means paralysis of spinal origin. Both sides of the body are usually affected equally, because the lesion involves both halves of the spinal cord. In the great majority of cases also the lower extremities and the muscles of the body up to the seat of the lesion corresponding to the nerve supply are paralysed. The arms are not as a rule affected. Control over the bladder and rectum is more or less lost. This motor paralysis may not be associated with any loss of sensibility. But if there be defective or altered sensation, then there may be a sense of constriction, as if a cord were drawn tightly across the body (girdle sensation). The electric irritability may be little altered, or it may, in certain parts, be what is termed "modified." "Reaction of degeneration" (see p. 432) is then said to exist, and marked atrophy soon supervenes in the muscles which exhibit this reaction.

Though both sides of the body are usually affected, yet this is not always the case, for one side may be paralysed while the other is active. In such cases the condition is recognised as *Hemiparaplegia*, and though the arm and leg and one side of the trunk may be affected, there is an absence of any trace of facial paralysis, even though the lesion may have its seat high up in the cervical region. In contradistinction to hemiplegia of encephalic origin, the paralysis of motion occurs on the same side of the body as the lesion in the cord.

Paralysis not of spinal but of peripheral origin is recognised by its being limited to the muscles supplied by a particular nerve or nerves. Here also we have an altered excitability of nerves or muscle, the "reaction of degeneration," and the muscles so affected speedily and markedly atrophy. This paralysis depends on disease or injury of nerve trunks.

Diagnosis.—Experience testifies that some diseases of the nervous system are associated with early life, as infantile paralysis, pseudo-hypertrophic paralysis, and chorea; while others are only seen at an advanced age, as paralysis agitans and multiple sclerosis. Experience also shows that a few symptoms, often a single one, may indicate threatening or actually existing disease; thus atrophy of the optic nerve or lancinating pains may foretell locomotor ataxy before other symptoms have appeared; by a group of symptoms we can recognise progressive muscular atrophy, tetanus, hysteria, epilepsy. But to form a correct and sure diagnosis, we must recognise and accurately estimate symptoms in conjunction with a thorough knowledge of the pathology of the spinal cord and the brain. We must try to distinguish the *spinal* form from the *peripheral* disease on the one hand, and from the *cerebral* on the other. As an end to this the points to be mentioned are of practical importance.

1. The following circumstances are allied with a *peripheral* localisation: The disturbances being limited to single nerves or groups of nerves; exact coincidence of the disturbance, motor, sensory, vaso-motor, and trophic, with the distribution of a peripheral nerve; *absence of retarded conduction of sensation;* absence of weakness of the genito-urinary tract; certain results of electrical examination; presence of great disturbance of the trophic function; the existence of a known local cause of origin.

2. The following circumstances favour a *cerebral* location: Hemiplegia, with loss of sensation and motion on the same side; absence of all trophic disturbance; normal electric reaction; retention or exaggeration of all reflex acts; retention of the functions of the bladder and rectum; evident disorder of the higher senses and of various cerebral nerves; affections of speech and of the mental functions; presence of headache, giddiness, and vomiting not due to gastric causes (causeless vomiting).

3. The following circumstances favour a *spinal* seat of the disease: Paraplegia; in case of hemiplegic symp-

toms, crossing of motor and sensory disturbances; girdle sensation at the upper limit of the other disturbances; exaggeration or weakening of spinal reflex action; paralysis of the rectum; incontinence of urine; bed-sores; definite para-æsthesia; retardation of the conduction of sensory impressions; absence, as a rule, of any implication of the higher organs of sense and of the cerebral nerves.

All these points possess by no means an absolute, but only a conditional value; their significance is not always decisive, except in connection with other symptoms and a careful reflection on all circumstances brought under our notice. When we have decided that the cord is the seat of the lesion, then we have to LOCALISE this seat and the NATURE of the lesion. With regard to the nature, we may say that spasm, pain, and increased reflex action are symptoms of irritation, and lead us to infer a corresponding pathological state; symptoms of paralysis point to a more serious condition of disease, viz. degenerative processes, softening or compression, and destruction of the cord.

To aid still further a differential diagnosis, we will indicate characteristic gaits or walks in spinal affections. There are three leading varieties:—

1. The paretic and paralytic gait, caused by a more or less extensive palsy of the lower extremities. The gait is shuffling, the tip of the foot drags on the ground, and the sole is planted awkwardly, usually with the outer edge first. The patient walks with the aid of canes, or requires the support of crutches or attendants. He may be able to stand thus securely; but, when left alone, he in most cases simply sinks to the ground.

2. The ataxic gait, due to disturbance of co-ordination in the legs. The movements are hurried and characteristic. The point of the foot does not drag. It is thrown forward and outward, and the heel is brought down with a decided stamp while the leg remains stiff at the knee. The patient's eyes are directed to his feet, as in this way he can stand without inconvenience. But, if

his attention is directed to the ceiling, he totters and falls; and the same thing occurs if, when walking, he is asked to turn round quickly.

3. The stiff spastic walk, due to reflex muscular contraction or tension associated with paresis of the legs. The legs are dragged. The feet seem to cleave to the ground, and the tips appear to find inequalities even on a level surface. Every step is accompanied with a hopping movement of the body, which is slightly bent forward. The tendency is to walk on tiptoe, and there is no throwing about of the feet.

Generally speaking, the first variety is dependent on disease of the anterior columns of the cord; the second, of the posterior; while the third involves the lateral columns. The first two are often seen; the latter is rare.

The morbid conditions that give rise to paraplegia fall naturally into two groups. The first includes all those affections which have their seat WITHIN THE CORD itself. The second is made up of those in which the primary lesion is OUTSIDE THE CORD, this being subjected to A SLOW COMPRESSION, annihilating its functions (Fagge). Following on this division we shall now consider the affections which commence *within* the cord.

MYELITIS.—Two principal forms of this disease are recognised, viz. *acute* and *chronic*.

ACUTE MYELITIS is an acute inflammation of the spinal cord, which rapidly leads to serious disturbances, and is usually, if not always, attended by fever.

Etiology.—The tangible cause is generally unknown. Among predisposing causes are sexual excesses, or severe bodily exertion. The exciting cause is frequently the result of an injury; next in order comes slow compression of the spinal cord; next, catching cold. It may follow on acute diseases, as typhus fever or variola, or supervene on chronic diseases, as syphilis.

Pathology.—The inflammatory changes start from the gray substance, sometimes affecting the whole cord, some-

times only a small portion, sometimes only the periphery. There are three different stages of the inflammatory process—(1) hyperæmia and commencing exudation (red softening); (2) fatty degeneration and absorption (yellow and white softening); (3) the terminal stage (formation of cicatrices or cysts, induration, sclerosis).

Symptoms.—The mode of commencement is variable. Sometimes it is preceded by general weakness and fever; dragging pains in the limbs; sometimes it is ushered in by spinal symptoms, consisting of disturbances of sensation, and motor signs of irritation. Very soon—indeed, after a few hours, or the next day—appear characteristic paralytic symptoms in the form of motor and subsequently sensory paralysis. In almost all the severe cases vaso-motor paralysis sets in, and is accompanied by cystitis and extensive bed-sores. The subsequent course of the disease varies. It may be rapidly or more slowly and less violently fatal; or it may develop into chronic myelitis or incomplete recovery; or finally, and unhappily rarely, complete recovery takes place with protracted convalescence.

Chronic Myelitis.—"We understand," says Erb, "by chronic myelitis all those slowly developing processes in the spinal cord which run a tedious, lingering course, without fever, and which in the present state of our knowledge are ascribed to chronic inflammation."

Etiology.—The disease is most common in youth and middle age, and in the male sex. Chronic myelitis may proceed from the acute form. Catching cold, often-repeated exposure, sleeping on damp earth, great exertion combined with cold, are exciting causes. Sexual excess predisposes, and may also prove an exciting cause, and syphilis is also without doubt a very fruitful source of chronic myelitis.

Pathology.—A cursory examination may reveal no very marked change either in the colour or the markings, or even in the consistency of the cord. But the changes are shown when hardened preparations of the cord are submitted to a microscopic examination. Thus there is

observed a hardening or sclerosis of the cord; with gray degeneration; with localised areas, involving part or the entire thickness of the cord, or extending over the greater part of the structure. The meninges present signs of chronic inflammation. The nerve-roots are atrophied in many cases, and the peripheral nerves are frequently found in a state of degenerative atrophy. The muscles are in the same condition, rich in connective, and sometimes abundantly supplied with adipose tissue. Changes also are seen in the cartilages of joints, in the bladder, and in the vessels.

Symptoms.—The clinical history is essentially the same as in the form of acute myelitis, with the difference that there is a slow development of the disease, and its duration is always protracted, and may last for years. There is also an absence of fever.

Treatment—Acute Myelitis.—Injuries of the spinal column must be treated surgically, and simple concussions must receive due attention. If premonitory signs of myelitis arise from exposure to cold or fatigue, then diaphoretic treatment does good by means of hot drinks, the warm bath, and local applications of poultices to the back. When in syphilis acute myelitis is developed, then active mercurial treatment is essential until symptoms of salivation are produced, when it should be stopped and iodide of potassium given. In all severe and threatening cases, where no premonitory symptoms have been observed, local blood-letting by leeches or wet cups is indicated; the back should be covered with cloths wrung out of hot water; and the inunction of mercury should be used on the back and other parts of the body. Brown-Séquard recommends ergot and belladonna to counteract the hyperæmia. Castor oil or sulphate of magnesium should be administered as laxatives, and acetate of potassium as a diuretic. *The electric current should never be applied in a case of acute myelitis.*

Dietetics, etc.—Easily digested but nourishing food; no spirits, no tea or coffee; absolute mental rest; careful attention to the skin, which must be washed regularly.

Every precaution must be taken to prevent the development of cystitis and bed-sores. If the acute stage is passed safely, then the restoration and regeneration of tissue should be aided by stimulating food, wine, and fresh air; thermal and brine baths; and the employment of the electric current.

Treatment—Chronic Myelitis.—In the treatment of chronic myelitis we should remember that recovery is rare, and in the most hopeful cases slow. Energetic and active treatment leads to disappointment and failure. Chief reliance must be placed in three therapeutic agencies: (1) thermal brine baths (Rehme, Nauheim); (2) rationally conducted cold-water cure, as simple rubbing with wet cloths, sponging the back, hip-baths, local compresses to the back left on till they become warm; (3) careful electrical treatment, with a current not too strong nor long applied, continued for months with occasional brief pauses. The best internal remedies are ergot and belladonna.

Dietetics and Mode of Life.—The diet should be similar to that recommended in acute myelitis. The bowels should be kept open by aperient enemata. Exercise should be taken, if the patient be able to move about, in the open air, but should always be stopped when there is the slightest sensation of *fatigue*. A sojourn in summer at a high altitude is useful, and the winter at an equable temperature, as at the Riviera, Algiers, etc. Paraplegic patients should have fresh air, and for this purpose a wheel-chair may be used with advantage.

ANÆMIA OF THE CORD.—By this we understand a diminution in the amount of blood contained in the cord.

Etiology.—Thrombosis or embolism of the abdominal aorta above the point of departure of the lumbar arteries; mechanical pressure on the cord; great loss of blood—*direct*, as from parturition, menorrhagia; *indirect*, as from severe acute diseases, occasionally from poverty of the blood, as in chlorosis.

Symptoms, Course.—The most constant symptoms are

motor weakness, great fatigue on exertion, slight tremor, and in some cases severe paresis, and at last paralysis. The motor weakness begins in the lower extremities, and may extend gradually to the trunk and arms. Recovery may *take place* rapidly by collateral circulation when the anæmia is due to thrombosis or embolism, or by regeneration of new blood, when due to parturition, etc. Recovery *is slow* when the impoverishment of the blood by chlorosis has been prolonged. Recovery may *not* take place: the cord softens, symptoms of severe spinal paralysis set in, in the midst of which death occurs.

Treatment.—1. Remove if possible the cause of the disease: if due to aortic thrombosis, by proper position, stimulation of the function of the heart; if due to chlorosis, by tonics and iron.

2. Position.—Dorsal decubitus with raised head, arms and legs being maintained during the night and several hours in the daytime in the same position.

3. Electricity to the spine (ascending current) with the object of dilating the vessels of the cord.

Internal Remedies.—Nux vomica, $\frac{1}{2}$ grain of extract, in combination with phosphide of zinc $\frac{1}{11}$ grain, three times a day; opium; nitro-glycerine or nitrite of amyl. These remedies increase the flow of blood to the cord.

Spinal Apoplexy—Hæmorrhagia Medullæ Spinalis.—These titles include any kind of extravasation of blood in the substance of the cord proper.

Etiology.—Males in youth and middle age are most frequently attacked. The direct causes are, in the *first* place, surgical injuries, as by a fall or blow on the back, by violent shocks in riding, without any direct traumatic lesion of the cord; in the *second* place, all circumstances which produce a strong active congestion of the cord, as exposure to cold, sexual excesses, extreme exertions of the body.

Pathology.—The bleeding is mostly confined to the gray substance, and its dimensions vary. Two kinds of extravasation are distinguished:—

1. The *Hæmorrhagic* (or apoplectic clot), as big as a pea, an almond, or at most a nut, composed of blackish-red blood, coagulated and sometimes fluid in the centre. The substance of the cord is broken down to a corresponding distance, and forms around the clot a sort of ragged wall. The cervical and dorsal regions are by far the most frequently affected. The clot undergoes a series of changes—(*a*) it either thickens, (*b*) dries up to a crumbly caseous lump, or (*c*) the process of softening occurs, the serous contents being surrounded with a hard capsule of connective tissue. Secondary disease of the cord may be found consisting of softening, which extends to various distances up and down, often to nearly the whole length of the cord.

2. *Hæmorrhagic infiltration* or softening; inflammatory hæmorrhage.—This likewise occurs in the gray substance exclusively, and is of varied extent. It leads to changes similar to those mentioned as existing in the clot, plus growth of connective tissue.

Symptoms.—The symptoms vary. There may be sudden access without premonitions—the patient falls down with violent pains and paraplegia without loss of consciousness; or there may be premonitions, which consist of the symptoms of spinal congestion—pain in the back, weariness, hyperæsthesia of the skin, or the symptoms of acute general myelitis, fever, violent pains, girdle sensation. These premonitions usually last hours or days, until the apoplectic paraplegia appears. This paraplegia in all cases is complete—the paralysed muscles are lax, and the motor paralysis is accompanied by anæsthesia, more or less complete, and by paralysis of the bladder and rectum. In the succeeding days and weeks gangrenous bed-sores form on the places exposed to pressure; the urinary secretion is bloody, purulent, albuminous; the paralysed muscles become atrophic, with loss of faradic excitability.

Course, Duration, Termination.—The case may be soon fatal through paralysis of respiration, or may be protracted for a long time, with partial recovery. Complete cure is rare, and only possible when the clot is very small.

Treatment.—For the hæmorrhage little can be done, but to prevent a recurrence ergotin should be injected. Afterwards we have to treat the sequelæ, by trying to prevent bed-sores and cystitis. If the first weeks pass without serious relapses, iodide of potassium should be given, with lukewarm or brine baths, and the scientific application of electricity employed.

CONCUSSION OF THE SPINE.—The symptoms of concussion of the spine may arise from any form of concussion of the body, but their comparatively frequent occurrence after railway accidents, and actions for damages ensuing, have led to the word Railway Spine being used as a synonym for concussion of the spine. The symptoms are various, and do not follow any recognised sequence with regard to the time of their appearance or their continuance. If the shock experienced affects the brain as well as the spine the symptoms are sudden and severe, with loss of consciousness, paralysis, collapse; and such a case may end fatally in a few hours. But in other cases the brain, if affected at all, recovers rapidly, and consciousness is not lost, neither is there any distinct collapse. Subsequently, however, to the accident, at varying intervals, general weakness develops, especially in the extremities, and walking soon fatigues. There is also a complaint of numbness over various parts of the body, and the vertebral column may be sensitive to pressure. The reflexes are often not normal, but they differ so much in individual cases that no direct definite guidance can be obtained from their responses. The great feature about such cases is nervous irritability, depression of spirits, loss of memory, and dizziness. Most cases, with rest, tend to recovery in months, or sometimes longer periods. Others do not get better, but gradually assume the type of severe spinal disease, as chronic myelitis, which leads to a fatal termination.

Treatment.—In treating the main symptom—the shock—it is necessary to place the body in an easy position and wait events. But if the pulse be weak and respira-

tion imperfect, stimulants, as ether, coffee, or alcohol, must be given; while cutaneous irritants, as mustard or turpentine, should be used. If the patient recovers and spinal symptoms come on, then rest is essential, with cold sponging of the spine. If the symptoms of active mischief seem past, strychnine should be prescribed in small doses, and its action carefully watched.

Acute Ascending Paralysis.—This is a puzzling and very serious disease of the spinal cord, first definitely described by Landry in 1859; characterised clinically by paralysis ascending rapidly from below upwards, until the medulla oblongata is reached; characterised anatomically by its leaving no pathological evidence of any change in the spinal cord or brain.

Etiology.—The causes are obscure. Exposure to cold and syphilis have been noted as exciting causes, and the disease has also occurred during convalescence from an acute febrile malady. The time of occurrence is between twenty and forty, and the male sex are attacked more frequently than females.

Symptoms.—Weariness of the limbs and numbness in the hands and feet may be the first direct evidence of the disease. Afterwards, at a short interval, there is extreme weakness of the lower extremities followed by actual paralysis. This paralysis is seen first in the distant portion of the limbs and gradually approaches the trunk, so that in the course of a few days paralysis of the lower extremities is complete.

The trunk muscles are next and soon implicated. The patient is unable to sit up. Constipation exists, and defæcation is interfered with through weakening of the abdominal muscles. Respiration is also affected; next the upper extremities are involved, paralysis commencing at the distant extremities and extending until the whole body becomes paralysed.

Though the muscles are lax there is no atrophy; and the electrical reaction of nerves and muscles continues perfectly normal.

Sensibility is not impaired, and there is no tendency to the formation of bed-sores, neither is there any increase of temperature.

In one-third of the cases noted the disease may be arrested, recovery taking place and power being shown first in the arms, second in the trunk, third in the lower extremities. In two-thirds of the cases the disease progresses, and ultimately the patient dies of asphyxia. Death may occur in three or four days, or not until as many weeks have elapsed.

Diagnosis.—The absence of fever, and its involving the medulla and producing a rapidly fatal issue, distinguish this disease from acute spinal paralysis. From chronic spinal paralysis it may be diagnosed by the absence of atrophy of the muscles, and by their electrical condition not being lost.

Treatment.—Treatment, in the absence of pathological lesions, can only be empirical. Gentle shampooing of the limbs has been recommended, together with brief daily applications of weak faradic currents to the affected muscles. A combination of iron and arsenic has been suggested, and the cautious administration of strychnine.

Compression-Paraplegia.—This may be due to (1) caries of the spine—Pott's disease; (2) malignant disease of the spine; (3) erosion of the vertebræ by aneurysm; (4) erosion of the vertebræ by a hydatid; (5) meningeal tumour; (6) meningeal gumma.

Symptoms.—Preceding paralysis there are symptoms which show that there is interference with the roots of the nerves coming off from the cord at or just above the level of the lesion. Charcot terms these *extrinsic* symptoms, while he gives the name of *intrinsic* symptoms to the loss of movement in the parts lower down, to the anæsthesia, and to the other effects of pressure upon the cord itself.

Of extrinsic symptoms pain is the most prominent, and it is associated often with an extreme degree of

hyperæsthesia. The extrinsic symptoms precede for months, or even years, the intrinsic symptoms.

Diagnosis.—The natural deformity produced by Pott's disease renders the diagnosis of it comparatively easy, but in malignant disease, tumours, and gummata the nature of the lesion is difficult to determine, and can only be solved by a careful analysis of the history and symptoms.

Prognosis.—The duration is variable in malignant disease. It commonly runs a course of some months, or a year, after the intrinsic symptoms are observed, death taking place by wasting and dropsy, or by direct interference with the vital functions of the cord. Meningeal tumours may, according to Erb, last for two or five years, or more.

Treatment.—Treatment can only be palliative in malignant disease. Thus relieve the pain by morphine injections, and guard against the formation of bed-sores. If the history reveals syphilis, mercurial treatment, followed by iodide of potassium, may take away the syphilitic gumma. In Pott's disease a plaster-of-Paris bandage is necessary, applied according to the rules laid down in surgical works, with cod-liver oil and nourishing diet.

Diseases of the Membranes of the Spinal Cord.—By hyperæmia of the cord and its membranes we understand an increased supply of blood to the tissues contained within the vertebral column, the spinal canal, its membranes, and the extra-meningeal cellular tissue. This excess of blood may be active (arterial) or passive (venous).

Symptoms.—The most prominent symptoms are those of sensory irritation; dull pain in the loins and along the spine, which pain is not always increased by pressure; tingling and formication, followed by tearing pains in the extremities; moderate increase of reflex activity.

Course.—As a rule, the development of hyperæmia of the cord is slow, the symptoms increasing in intensity and

continuing with various degrees of severity for days, weeks, or months. The disease usually ends in recovery.

Diagnosis.—Spinal hyperæmia is distinguished from spinal meningitis by the absence of spasms of the back and neck, fever and pains on moving the limbs; from spinal apoplexy by its comparatively slow development and rapid termination in recovery; from acute myelitis by the absence of paralysis of the bladder and bed-sores.

Treatment.—(1) A suitable position, on side or face with extremities low; (2) cupping or leeching along the vertebral column; (3) warm douche applied several times a day to the back, washing with a cold and hot sponge alternately; (4) internally by the saline springs of Homburg, Kissingen, Marienbad, Karlsbad.

Internal Remedies.—Ergotin and belladonna. These remedies decrease the flow of blood to the cord.

Spinal Meningitis may be tubercular or idiopathic, and though the cause is different in the forms mentioned, the clinical and pathological aspects are usually considered together.

Symptoms.—Fever; pain in the back, increased by movement, and following the course of the nerves proceeding from the region implicated by the disease; stiffness of the neck, trunk, or limbs; hyperæsthesia of the skin; retention of fæces and urine; supervention, in the later stages, of paresis or paralysis of the limbs, characterise spinal meningitis. If these symptoms are not accompanied by headache, vomiting, slight delirium, or paralysis of ocular muscles, then the brain is not implicated, and the form of the affection is not tubercular.

Prognosis.—Complete recovery is rare, but partial recovery, with some amount of atrophy or incurable paralysis, sometimes occurs. In a very large percentage of cases a fatal issue results in the course of a few weeks. If there be a continually rising temperature—to 105° or onwards—the prognosis is bad.

Treatment.—This essentially consists in easing pain by opium or morphine. When these remedies do not agree

with the patient, cannabis indica should be tried, or bromide of potassium. The affected region should be blistered or painted with tincture of iodine. Suitable feeding and careful nursing are requisite, and the position of the patient should be either on his side, or if possible on his face.

Sclerosis (*Synonym*, Chronic Interstitial Inflammation, called gray degeneration).—In the nervous system of the brain and spinal cord there is, besides nerve cells and nerve fibres, another element present which binds them together, and gives the whole substance its normal degree of consistence. This substance fulfils, to all in-



Fig. 21.

Semi-diagrammatic representation of the changes in multiple sclerosis at different levels of the cord. The dark spots represent the sclerotic nodules.

tents, the purpose of connective tissue in other organs of the body, and has been named *neuroglia* or *nerve-cement*. In sclerosis, this *neuroglia* is increased or hypertrophied, the nervous substance proper being in consequence compressed and atrophied. The result is increased hardness and density over a greater or less extent of the nervous system involved. Hence different forms of sclerosis are recognised—as Multiple Sclerosis of the brain and spinal cord (Disseminated Nodular Sclerosis), Amyotrophic Lateral Sclerosis, Primary Lateral Sclerosis (the so-called Spastic Spinal Paralysis). We shall give a brief description of these types of sclerosis.

1. Multiple Sclerosis of the Brain and Spinal Cord.—Tremor is a typical symptom of this form of sclerosis, and from its peculiar character in only coming on with intended movements, it is termed "intention tremor"; for

though the movement is unequal and jerking, yet the purpose and the intention of it are on the whole retained. *When the patient is perfectly quiet there is no tremor.* If a patient attempts to seize any object, to pick up a parcel, or convey a glass to his head, the tremor becomes marked in the upper extremities, and if he be excited the tremor is more pronounced, and may extend from the arm and fingers to the head, trunk, and lower extremities. There are also other typical symptoms—disturbance of speech and nystagmus. The speech is slow and obscure, and sometimes unintelligible, with trembling of the lips and tongue. Nystagmus is revealed by twitching of the eyeballs, when the eyes are fixed on any object. In some cases there is marked paresis of the lower extremities, but more frequently spastic symptoms are shown, see p. 471. Gradually manifestations of mental weakness occur, marked by imbecility, and eventually, after headache and vertigo, there is loss of consciousness and hemiplegia.

The *prognosis* is very unfavourable, for although the affection may last a long time, there can be no hope of permanent recovery.

Treatment. — Of all medicinal remedies nitrate of silver, in $\frac{1}{4}$-grain doses thrice daily, seems the best, if carefully and continuously given: the amount should never exceed in all 200 grains, so that discoloration of the skin may be avoided.

2. Amyotrophic Lateral Sclerosis. — This affection occurs in males, chiefly between the ages of twenty-five and forty-five, and it seems to be due, according to Charcot and Flechsig's investigations, to systematic degeneration of the pyramidal tract of the spinal cord throughout its whole extent, or at least in certain portions of it, combined with atrophy of certain nerve nuclei in the medulla oblongata. The process is to be regarded as a simple degenerative atrophy, attacking fibre after fibre of the motor cortico-muscular conducting tract from the centre to the periphery. The point of origin is uncertain. It is doubtful whether it commences at one definite spot, extend-

ing downwards and upwards, or whether the fibres throughout their whole extent, with the corresponding ganglion cells and muscular fibres, are primarily implicated.

Symptoms.—The first signs of the disease begin with a tired feeling in one arm, which gradually increases to actual weakness, and some months later the same signs of tiredness and weakness involve the other arm. Increasing wasting of the muscles of the arms is detected, notably of the triceps and the deltoid, and to a less degree the biceps and the muscles of the shoulder. The interossei muscles also atrophy, and the muscles on the extensor side of the forearms. With the atrophy there is functional disturbance evidenced by paresis. About six months or a year after the commencement of the disease symptoms appear in the lower extremities, evidenced by a stiff and uncertain gait, a tired feeling, and sometimes tremor.

Diagnosis.—Examination of the tendon reflexes shows much increase, and in this respect it differs from progressive muscular atrophy, where there is entire absence or marked decrease. The complete absence at first of sensory or vesical disturbances distinguishes it from Bulbar Paralysis.

Prognosis.—The prognosis is markedly bad. Slowly but without halting the disease advances, and usually leads to death in a few years.

Treatment.—It is perhaps possible to check the progress of the disease by systematic and patient electrical treatment.

Paralysis Spinalis Spastica (Primary Lateral Sclerosis).—Erb in 1875, and soon after Charcot, drew attention to this peculiar form of paralysis, and both agreed in assuming it to be a "primary symmetrical sclerosis of the lateral columns." This assumption of Charcot and Erb has been verified by Dreschfeld in a case where a post-mortem examination was made. The clinical features of the disease in a case which came under my observation were, gradually increasing paresis and paralysis in a female aged thirty-six, after a prolonged

labour. The affection was located in the lower extremities, and was characterised in its advanced stage by muscular tension and reflex contractions, to such an extent that the legs could not be separated at the knees, and the heels were drawn up so as to touch the buttocks. There was no loss of sensibility, and no wasting of the muscles. There was complete control over the bladder and rectum, and the intellect was clear and unimpaired. She was doomed to permanent "lying still," but she suffered no pain, and in the condition described gave birth to a healthy child. In the early period of the disease the spastic gait was marked, and consisted in a clinging of the feet to the ground, so that movement was stumbling and uncertain. This was followed by a tiptoe hopping progression, the heel never being planted firmly, and by the body being bent forwards.

There was an increase of the tendon reflexes—the patellar reflex and the ankle clonus. This increase and the motor paralysis are the most prominent symptoms of spastic paralysis, and sufficiently distinguish it from amyotrophic paralysis, which, however, in the increase of the tendon reflexes, is the same in both affections.

Prognosis.—The disease runs a very slow course, with no pain and no incontinence. In some instances it appears to be arrested, and even cases of recovery have been noted. These cases are, however, exceptional, and the prognosis is on the whole unfavourable.

Treatment.—If there be a suspicion of syphilis, iodide of potassium should be given. Ergotin and nitrate of silver have also been recommended as internal remedies. Against the spastic symptoms warm baths for an hour daily, at a temperature of 90° F., do good, and render the limbs more relaxed and flexible.

PROGRESSIVE MUSCULAR ATROPHY (*Synonym*, Wasting Palsy).—This affection is closely allied to amyotrophic lateral sclerosis, but yet in its symptoms, course, and pathology seems essentially distinct.

Pathology.—In the spinal cord, especially the cervical

portion, the anterior gray cornua are very small; the ganglion cells having largely disappeared, and the few remaining are atrophied; fine fibrous tissue replaces the neuroglia, yet the lateral columns, especially the pyramidal tracts, are perfectly normal. The anterior roots and the affected motor fibres in the peripheral nerves are also atrophied. The muscles affected during life are seen after death to be reduced to small flabby bundles, in which fat and connective tissue outweigh the muscular tissue. It is a matter of dubiety how the disease commences—*i.e.* is it muscular or spinal, or is the degeneration muscular and spinal contemporaneous?

Symptoms.—As a rule the course of the disease is very slow. It begins most frequently in the upper extremities, its commencement primarily affecting the small muscles of the thumb, and causing a flattening of the ball of the thumb. Afterwards it attacks the muscles of the forearm on the external side, and in the upper arm the deltoid and then the biceps. The disease progresses slowly but steadily until every voluntary muscle of the body is involved, with the exception of the muscles of the eyeball and the levator palpebræ superioris. Years may, however, elapse before the general muscular atrophy is complete, and the arms may be perfectly useless while the patient can still walk without fatigue. The tendon reflex is absent. The sensibility of the skin and deeper parts remains untouched, and the functions of the sphincters of the bladder and rectum are normal. As the disease progresses the muscular region which receives its nervous supply from the medulla is also implicated, and the symptoms of progressive bulbar paralysis are added to those of progressive muscular atrophy. If so, then the speech becomes thick, swallowing is difficult, and the patient dies from paralysis of deglutition and respiration, or some intercurrent disease.

Prognosis.—The prognosis is unfavourable, but the disease may last for ten or fifteen years, or even longer.

Treatment.—Some improvement of a temporary kind

follows on massage and electrical treatment, conducted in a systematic and persevering manner. If there be any suspicion of syphilis, iodide of potassium should be given.

Pseudo-Hypertrophic Paralysis. — This is a peculiar form of paralysis, in which the ultimate fibres of the muscles atrophy and are replaced by interstitial fat and fibrous tissue, so that the muscles seem actually hypertrophied. The *false* muscular development begins frequently in early life before the child, usually a male, should walk. It commences in the gastrocnemii and the flexor muscles of the thigh, and also attacks the erectores spinæ. As the disease progresses other muscles suffer, particularly those of the trunk, upper limbs, and face, and in some instances the non-development of fat makes the condition appear to be simply one of atrophy. When the disease has advanced, the whole of the voluntary muscles are implicated in the degenerative process, and become more or less atrophied.

Pathology.—Though the muscles seem firm, hard, and increased in size *at first*, yet if a portion of the muscle is removed by the "emporte-pièce" of Ducheune, a microscopic examination shows that the muscle is atrophied, and that the increase is due to the interstitial development of fat and fibrous tissue. Charcot and Cohnheim have failed to discover any alteration in the nervous system, but Lockhart, Clarke, and Gowers state that they have observed extensive degeneration of the gray matter of each lateral half of the spinal cord and in the anterior commissure. Some pathologists aver that the disease is essentially *progressive muscular atrophy*, deviating from the ordinary form only in this, that the pseudo-hypertrophic paralysis begins in the lower extremities.

Symptoms.—At an early stage of the disease, when the child is stripped the enlargement of the calves generally contrasts greatly with the emaciation of the upper half of the body. The belly appears swollen, but this is not actually the case, its unnatural prominence being due to the fact that the antero-posterior curvature of the

vertebral column is much exaggerated, and that the shoulders are thrown back. The walking is waddling, as it were, on tiptoe, the heel not being placed on the ground. A child thus affected has not much muscular power, for he is easily knocked over; yet he can recover the erect posture with comparative ease from a sitting position. In the later stages of the disease walking is impossible, and the child lies still. The disease, on an average, lasts from five to six years, and death ensues from exhaustion or from intercurrent disease.

Treatment.—The prognosis is essentially unfavourable, and no medicine at present known seems to have any power to arrest its progress. In the early stage Ducheune recommends faradisation and shampooing.

Toxic Paralysis (Lead Poisoning). — This occurs among those who are engaged in lead works, and those who handle the metal or lead salts in their occupations, as painters, typefounders, compositors, and white enamellers; or it may be the result of the impregnation of drinking water with lead from the cisterns in which it is stored.

Symptoms.—There are certain typical symptoms in all cases of this affection, viz. colic, constipation, a blue line on the gums. And in some cases there follow paralysis and other nervous symptoms, and a tendency to gout or to disease of the kidney (granular kidney).

Increasing weakness and marked constipation precede the colic, the pain of which is of no ordinary kind, but sharp, twisting, spasmodic, felt most at or around the umbilicus, and relieved by pressure.

A characteristic blue line is observed on the gums, which is due to the deposit of particles of sulphide of lead in the papillæ of the gums. This line is interrupted if a tooth be lost. In some cases lead paralysis follows, and is due to the implication of the musculo-spiral nerve, and results in paralysis of the extensors of the forearm—an affection which is commonly known as "Wrist Drop" or "Dropped Wrist." The affected muscles are wasted and paralysed, and the hand hangs

powerless from the wrist; the fingers are more or less forcibly flexed; if placed with the palm downwards on the table the patient is unable to turn it round so as to bring the palm uppermost. The muscles which form the ball of the thumb are sometimes wasted and sunken, and if the muscles about the shoulders are attacked the joints lose their roundness, and the outlines of the bones can be felt much more plainly than is natural.

Most frequently both upper limbs are attacked, but the right usually suffers most.

As a rule the loss of power precedes the wasting, and the muscles present the reaction of degeneration, hence called "degenerative," but occasionally the weakness and wasting proceed together ("primary atrophic") and faradic and voltaic irritability are both lessened in proportion to the wasting.

Pathology and Morbid Anatomy.—The "degenerative form" depends upon the condition of the peripheral nerves, and on microscopical examination the nerves present the appearances generally met with in peripheral neuritis (see p. 440). The "primary atrophic form" is possibly dependent upon changes in the spinal cord.

Treatment.—If the hands of workers employed in lead works, etc., be properly washed and the nails cleansed before taking food; if the food be taken outside of the work, and if the bowels be acted upon weekly by a dose of sulphate of magnesium, there does not appear to be much likelihood of lead entering the system and creating the disturbances mentioned. But if these precautions be neglected there is a manifest probability of "lead poisoning" occurring, and if it should occur, the line of treatment is obvious: (1) to relieve the colic and constipation, and (2) to eliminate the lead from the system. Therefore give sulphate of magnesium in a dose of half an ounce every half hour until a motion takes place. If after three or four doses no action be manifested, then administer a minim of croton oil. This rarely fails to secure a motion. The colic is best treated by hot fomentations to the abdomen frequently renewed. After

the acute symptoms have subsided, sulphate of magnesium should be given with *small* doses of the iodide of potassium, the soluble iodide of the metal which results being eliminated by the action of the purgative. The diet should be nutritious, and when paralysis exists the application of a continuous current just sufficiently powerful to excite contraction of the affected muscles is recommended. If there be reaction of degeneration, faradic excitability will be lost and faradisation would be useless.

Mercurial Palsy or Tremor is caused by long-continued exposure to the fumes of mercury, and is characterised by tremors and jerkings of the voluntary muscles, beginning in the arms but extending sometimes to the legs, tongue, and jaws. These movements are increased by the mind being brought to bear upon them or by attempts at exertion.

Permanent bad health is often the result.

Treatment.—This consists in withdrawing the patient from the impure air to a fresh atmosphere, and giving iodide of potassium.

Locomotor Ataxy (*Synonym*, Tabes Dorsalis) is a peculiar form of paralysis due to disturbed co-ordination of muscular movements. In health the muscles must contract and relax in unison with the movements we may desire. If one muscle contracts too soon and another relaxes too quickly, then there is disturbed co-ordination of muscular movements.

Etiology.—The cause of locomotor ataxy is obscure, yet undue exposure to cold or damp after a long journey, venereal excesses, mental exhaustion, and syphilis seem in some cases to lead to its occurrence.

It is especially a disease of males, and is rarely met with in youth, usually occurring between the ages of thirty and fifty years.

Symptoms.—The onset is insidious. The first suspicion of there being anything wrong is frequently awakened by an inability to run, through a feeling of the legs being too heavy. This is followed by fatigue

after any exertion, and by increased micturition. The desire for sexual intercourse is at this stage of the disease increased. Dr. Althaus mentions as one of the earliest symptoms the inability to walk backwards. In some cases lancinating (lightning) pains are first experienced, especially at night. The disease progresses often slowly, and months or years may intervene before the patient presents the well-marked symptoms of locomotor ataxy, viz. a straddling gait in movement, the foot being lifted high in the air and planted down heel first. To support his balance the patient grasps at anything that may be near, as a friend's arm or a convenient chair. He is unable to walk in the dark, or with his eyes shut. A feeling of constriction is also complained of, as if a cord were drawn tightly round the abdomen.

In severe cases the patient cannot stand steadily, certainly not with his eyes shut, nor can he walk on a narrow board, the breadth required being a gauge of the severity of the affection. Usually there is diminished tactile and muscular sensibility of the lower extremities, with numbness or formication. These symptoms may be preceded by transitory pains, as well as by fleeting phenomena referable to the cerebrum—amaurosis, difficult deglutition, etc. Electro-muscular contractility remains intact to the last. There is neither palsy nor wasting of the muscles; and, if the patient be placed on a chair, you cannot bend his legs against his will.

In health, if a smart tap is made on the patellar tendon while the legs are hanging loosely over the side of the bed, the foot is immediately projected forwards (Westphal's test). In locomotor ataxy the knee reflex is absent. The stroke may be made either with the hand or a cane, but no response is elicited, thus indicating that reflex action, through disease of the cord, is in abeyance.

The eye symptoms observed in certain cases of locomotor ataxy may be summarised as—

1*st*, Insensibility of the pupil to light, while it acts with accommodation—Argyll-Robertson's phenomenon.

2*d*, Frequently there is atrophy of the optic nerve.

As the disease progresses it does not stop at the legs, but creeps upwards. Arms, hands, and fingers are involved. The coat cannot be buttoned, the pin put into the cravat, nor the spoon carried to the mouth. The urine is passed involuntarily in bed, and now the sexual power and appetite are diminished. Thus the patient may remain for years. Ultimately, the lower extremities become thinner, emaciation attacks the whole body, and death results from general weakness, consumption, or other intercurrent disease.

Pathology.—The spinal cord is invariably altered in structure. Generally the membranes are much congested and thickened posteriorly by exudation, and adherent to each other and to the posterior columns. The distinct lesions are, however, in the posterior columns, especially in the posterior root-zones, and the nerve-roots are the parts chiefly affected. The morbid change consists of atrophy and disintegration of the nerve-fibres with hypertrophy of the connective tissue. Oil-globules surround many of the blood-vessels. The pathological change seems to travel from the centre to the periphery, from the spinal cord to the posterior roots. In the cerebral nerves an opposite direction is assumed, centripetal instead of centrifugal.

Treatment.—If the disease can be clearly traced to syphilis there can be little doubt that improvement, if not cure, will follow on the use of inunction of mercury, with large doses of iodide of potassium internally, provided this specific treatment is begun early. In other cases, where the cause is obscure, it is advisable to use simple wet rubbings with water (beginning with 77° F. and going down to 68°), and half baths about 86° to 70°, with simultaneous sprinkling and washing of the back. Associate these with a careful and prolonged use of electricity by means of the constant current, and endeavour to secure the action of the single poles upon the entire extent of the cord. Thus, place both poles on the vertebral column, one at the nape of the neck, the other at the lumbar region. Then one pole, say the lower, being fixed, the

other may be moved quite slowly down over the back and thus brought in contact with the greater part of the cord; and likewise the upper being fixed, the lower may be gradually carried over the major part of the cord. The application should not exceed three to six minutes daily, and a strong current should be positively avoided. The treatment should be persevered with for months, and should only be discontinued if the patients feel more tired and weak after each application, if their condition as

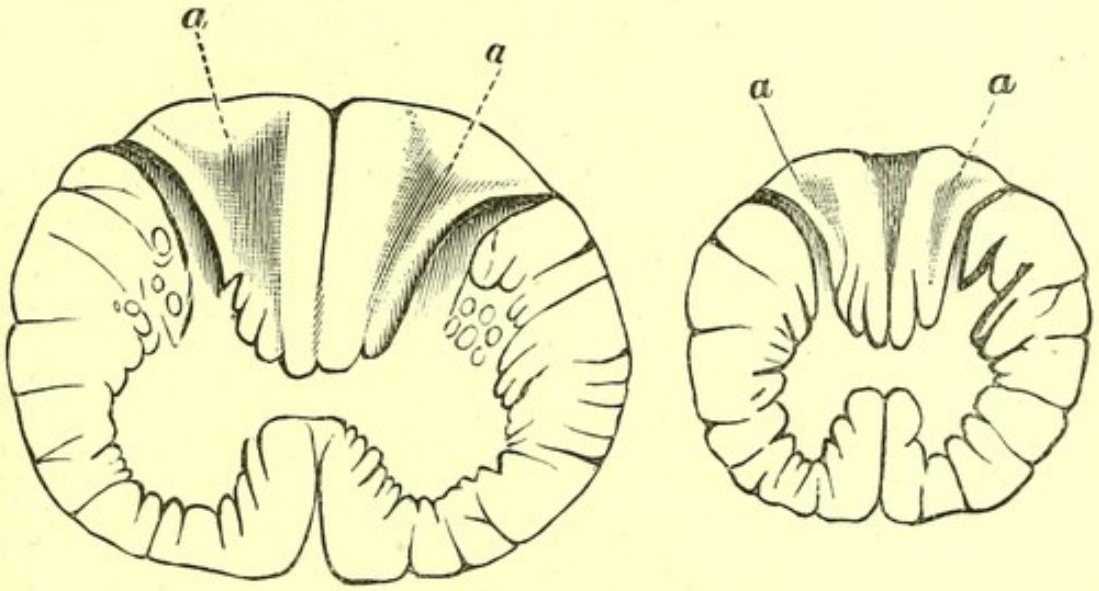


Fig. 22.

Sclerosis of the posterior columns in the first stage of Tabes.

a whole grows gradually worse, if the pains increase, or if sleeplessness sets in.

In more advanced cases, nitrate of silver has proved beneficial, one to one and a half grains being given in divided doses in the course of a day, and the remedy may be continued until 120 grains have been used. Bromide of potassium in some instances relieves the pain, while strychnine is decidedly objectionable, and the use of belladonna and ergot has not been attended with much success. Treatment by suspension, recently advocated, has given rise to very diverse opinions as to its mode of action; some saying that the cord is lengthened, others that it is relaxed; others again assert that no change occurs in the cord, and that the effects are purely the result of

"suggestion." An impartial consideration of cases reported leads to the conclusion that suspension is no cure for tabes, but that it relieves certain symptoms; these symptoms, however, are chiefly those of a subjective character, as pain and other sensory symptoms, while the more purely physical signs of the disease, as the Argyll-Robertson pupil and the lost patellar reflex, remain unchanged. In more advanced and completely developed cases, it is better to refrain from all useless attempts at any curative treatment, and simply attend to symptomatic indications, as, relieving the constipation by enemata or appropriate diet, assuaging the lancinating pains by subcutaneous injections of morphine, and seeking to secure as comfortable a life as may be for the victim of an incurable disease.

Hereditary Ataxia (Friedrich's).—This is a hereditary form of ataxia, almost always occurring among females in the same family, somewhere between twelve and eighteen years of age. It commences with ataxia of the legs, which soon passes into the arms. The tendon reflexes may disappear, but the sensibility of the skin and muscles is unimpaired, and the functions of the bladder are normal until a late period of the disease. Vision is unaffected, but there is disturbance of co-ordination of the lips and tongue necessary for normal speech. The course of the disease is protracted over many years. There is no chance of recovery, and the final issue is complete paralysis, contractures, and atrophy of the paralysed muscles.

Acute Spinal Paralysis.—This form of paralysis occurs six times more often in the first ten years than in the remainder of life, and hence up to late years it was designated Infantile Paralysis; but it is now known that adults, males more than females, may be occasionally affected. While its causes are very obscure, it has been clearly shown that the lesion is an acute inflammatory affection of the anterior cornua of the cord, which is followed by sclerotic changes, with destruction of the ganglion cells, and degeneration of the motor nerve fibres.

Symptoms.—The onset is sudden and attended with feverishness, occasionally convulsions, and pains, localised or general. The feverishness and pains may last for some days before paralysis is observed, which may be limited to a single group of muscles in one limb; or it may affect an arm and leg, or all four limbs at once. The affected muscles rapidly atrophy, lose bulk and become flaccid; the faradic current excites no contraction, and in severe cases galvanic irritability, though at first increased, ultimately disappears. The reflexes are quite lost, sensation is never seriously affected, and the bladder and rectum are not involved. In adults, but rarely in children, the paralysis having arrived at this stage gradually passes off. More frequently with children the parts affected become completely paralysed, their temperature falls, and permanent deformities take place. The disease is rarely if ever fatal, but death may occur from other causes, as pneumonia, or the exanthems.

Treatment.—In the early stage of the paralysis ice bags may be applied to the spine, and ergotin given in doses of $\frac{1}{6}$ to $\frac{1}{3}$ grain for children, and 1 or 2 grains for adults, twice daily. But after a month or so this medicine should be discontinued, and local treatment adopted. Massage is useful in promoting the circulation of the limb, and every effort should be made by passive movements and position to prevent deformities. The use of the induced current should be persevered in so long as muscular contractility continues. "If this is lost to the induced current, the case will be difficult and the treatment protracted; if the primary current is also powerless, a cure is impossible" (Hammond).

DISEASES OF MEDULLA OBLONGATA

Hæmorrhage into the medulla oblongata and the pons is produced by the same cause which operates in cerebral hæmorrhage. The symptoms are sudden—a shock, a falling down, with speedy if not immediate death. In

rare cases the fatal issue is averted, the effusion is gradually absorbed, and comparatively good health results.

Occlusion by embolism and thrombosis of the arterial supply of the medulla and pons may also occur, which, if not immediately fatal, will ultimately terminate in secondary softening (bulbar paralysis).

Acute or inflammatory bulbar paralysis is rare, and few autopsies have been as yet reported.

Compression of the Medulla.—*Acute* compression may occur from fracture or dislocation of the atlas and axis, while *gradual* compression may result from chronic disease of the bones round the medulla, from enchondroma of the base of the skull, from tumours of the dura or cerebellum. The *symptoms* following are—1*st*, Irritation in the distribution of those nerves, the roots of which are first affected, as of the trigeminus, or twitching of facial muscles, or tinnitus aurium. 2*d*, If compression continues, there are more serious bulbar symptoms, as affections of the speech and swallowing, paralysis of the tongue, soft palate, motor and sensory symptoms in the extremities, with cerebral disturbances, evidenced by vomiting, headache, and sometimes convulsions.

The prognosis is always bad, and death occurs through pneumonia or paralysis of the respiration.

Progressive Bulbar Paralysis (*Synonym*, Bulbar Paralysis).—In this disease there is a progressive degeneration and atrophy of the nuclei of the medulla oblongata.

Etiology.—The cause of the disease is uncertain. It hardly ever appears until middle life or old age, and men seem more liable to it than women.

Symptoms.—Some pain in the back of the neck may arrest the patient's attention, previous to his becoming aware of a gradual difficulty in pronouncing certain words distinctly. The words most difficult to pronounce are those in the utterance of which the tongue plays an essential part, as in hard consonants. Subsequent to this the tongue begins to atrophy and lies immovable

on the floor of the mouth. Speaking, chewing, and swallowing, become impossible. Neighbouring groups of muscles are also attacked, as those of the lips and tongue, and the facial appearance as the disease advances becomes painfully characteristic, for a persistent blank and mournful look pervades the whole aspect. Lastly, the muscles of the soft palate, pharynx, and larynx are involved, and yet the intelligence remains unclouded. The disease lasts from two to five years, and death occurs through inanition, or intercurrent disease, or through sudden asphyxia, or failure of the heart's action through implication of the pneumogastric.

Pathology.—The groups of symptoms mentioned are dependent on the degeneration and atrophy of the nerve-cells connected with the origin of the hypoglossal, spinal accessory, and pneumogastric nerves.

Treatment.—The nervine tonics, as nitrate of silver or ergotin, are suggested as internal remedies, with carefully conducted electrical treatment, based upon the nature of the disease and the parts implicated. In the later stages of the disease, when difficulty of deglutition is evident, the patient must be fed with soft food by the stomach pump or tube.

DISEASES OF THE BRAIN

The diseases of the brain in many instances are intimately associated with disease of the arteries of the brain; and the lesions which ensue group themselves into two classes—(1) obstruction or arrest of blood supply in one or more of the cerebral arteries, due to embolism, thrombosis, or syphilitic disease; (2) hæmorrhage, not from obstruction, but from actual rupture of an artery, whereby the blood is permitted to flow into the substance of the brain, which result is designated "cerebral hæmorrhage." We will now briefly state the nature of these lesions:—

Embolism.—Arrest of the blood supply may be due to

a cause acting outside the cranial cavity, as when a ligature or compression is applied to the carotid artery, which may bring on immediate paralysis, or lead to paralysis in a day or two. Such arrest of the supply is, however, rare, and in the great majority of cases the arrest or occlusion is connected with the circulation inside the skull. The embolus or clot is usually carried from diseased valves on the left side of the heart, sometimes, but rarely, from the aorta, to the particular spot where it arrests the blood-flow. The occlusion may, however, be produced in a different manner by a clot or thrombus being formed through disease of the arteries, as in arterio-sclerosis or syphilitic endarteritis. This occlusion is known as thrombosis, and is far less frequent than embolism. Occasionally it occurs not from disease of the vessels, but is dependent on a very feeble circulation, as in continued fever or pneumonia of a low type, and in carcinoma.

Emboli are carried very much oftener into the left carotid than the right, which is to be explained by the difference in the angle at which the left carotid and that at which the innominate are given off by the aorta. In the majority of cases they are not lodged below the circle of Willis, but are carried into the branch which forms the chief direct prolongation of the carotid—the arteria fossæ Sylvii.

Effects of Obstruction.—However originated, the effects of the obstruction by embolism or thrombosis are practically the same, and result in (1) no harm being done, because the collateral circulation set up is sufficient to nourish the brain substance deprived of its usual blood supply. (2) If this collateral circulation is not efficient, then there is a lack of nourishment, and structural changes occur, which have been designated "red softening." This structural change of red softening is not due to inflammation, but to the back-flow of venous blood into the area supplied by the obstructed artery. It may be termed hyperæmic engorgement, and through changes which occur in the vessels involved, there may be a

possible escape of red corpuscles, with a further stage of "yellow" or "whitish yellow softening"; or if this escape of red corpuscles does not occur, then softening may be present from the onset. In general terms, the entire pathological process is now justly recognised as necrobiosis, and microscopic examination shows within the first twenty-four hours nothing abnormal (in the cases where engorgement and extravasation exist) except the presence of red blood-cells. At a later period the nerve elements undergo gradual degeneration, just as the fibres of a peripheral nerve do after section of the trunk, and this retrograde metamorphosis progresses until finally the yellowish semi-fluid mass contains only fatty detritus, drops of fat, and in addition sometimes blood-crystals.

CEREBRAL HÆMORRHAGE means extravasation of blood into the brain, or beneath its membranes, and is dependent on rupture of a cerebral artery. The most frequent site of the hæmorrhage is in the neighbourhood of the corpus striatum or optic thalamus. The blood poured forth, varying in quantity, dislodges part of the brain substance, and lies in the cavity thus produced. The extravasation in fatal cases is great, and not limited to the substance of one hemisphere, but extends either to the surface or into the ventricles. More definitely we may say that the chief seats of cerebral hæmorrhage are the large ganglia in the neighbourhood of the lateral ventricles. Hæmorrhage into the convolutions, the pons, the cerebellum, the crura cerebri, or the medulla is rare. In an autopsy of a case of cerebral hæmorrhage, we find that the size of the extravasation varies, being small, or occupying a large part of an entire hemisphere. The wall of the effusion is composed of torn cerebral tissue, and the mass itself contains the debris of the nervous elements seen in coagulated blood. When the case is recent the blood clots are very dark in colour. But later on the colour changes to chocolate or yellow, and there is also a softening and swelling of the parts adjacent to the site of the hæmorrhage. If the patient survives, the effusion

diminishes in size, and the final result is in many cases a cavity filled with serous fluid, enclosed in smooth walls. "The apoplectic cyst" may remain stationary, or, if the effusion has been small, the fluid is absorbed, and there is nothing left but what is termed "the apoplectic scar."

Pathology.—In the great majority of cases of cerebral hæmorrhage, where a fatal issue occurs, and when an autopsy is made, it is found that there is chronic renal disease of the contracted granular form. In almost every case of cerebral hæmorrhage there exist, moreover, "miliary aneurysms," which appear as little globular masses in the small intracranial vessels, and which are due to diffuse arteritis proceeding from without inwards (see p. 281). The disease of the vascular wall is not peculiar to the brain, but is identical with arterio-sclerosis or atheroma, which is diffused more or less over the body. Charcot and Bouchard, who first described these miliary aneurysms in 1868, thought differently, and said they were only pathognomonic of cerebral vascular disease, but later investigations do not bear out this supposition; for, as a rule, sex influences cerebral hæmorrhage, being seen more often in men than in women. Age also has an important bearing; for cerebral hæmorrhage, as a rule, occurs rarely before the forty-fifth year. A hereditary predisposition is also often observed, together with a certain "habit" of body. In atheroma the same conditions exist.

Disease of the arteries, and more particularly miliary aneurysms, being thus regarded as the chief cause of cerebral hæmorrhage, there seems to be little doubt that an abnormal rise of blood pressure is also an important exciting factor. If it is granted that the change of the arteries exists, it can be inferred how a temporary elevation of blood pressure may act on the current and tension of the blood, and on the arterial walls. Thus cerebral hæmorrhage may follow great muscular exertion, straining at stool, indulgence in alcohol, extreme joy or anger, excessive venery in old people, or it may occur in cardiac hypertrophy, when there exists also contracted kidney

Cerebral hæmorrhage is not always dependent on miliary aneurysms. It may be simply symptomatic of impaired nutrition of the whole frame, and hence of diminished resisting power of the vascular walls. Thus in pernicious anæmia, scurvy, purpura, septicæmia, typhus, typhoid fever, or small-pox, cerebral hæmorrhage may occur, but not to such a great extent as when it is due to miliary aneurysm. The hæmorrhage in impaired nutrition is usually of a capillary character.

Clinical History.—Previous to the attack there may be symptoms which warn the patient of danger. Notably among these are defects of vision, dizziness, faintness, and sickness, or a peculiar difficulty in expressing ideas in articulate language. These prodromata may extend over weeks or months. But these prodromata may not exist, and suddenly, without warning, the patient, apparently in vigorous health, is struck down abruptly as if shot, and is rendered thoroughly unconscious with loss of sensibility and motion. This attack may be rapidly fatal, owing to the abnormal pressure paralysing the cardiac and respiratory centres situated in the medulla oblongata.

Another form of cerebral hæmorrhage is preceded by sickness and faintness and a state of syncope. From this state the patient may recover and be able to walk. After a few hours, the headache continuing, he becomes oppressed, and sinks into a comatose condition. Again, there may be a sudden attack of hemiplegia, with loss of speech, which, after the lapse of a few hours, gradually passes into coma. In whatever way the cerebral hæmorrhage occurs, there are certain phenomena very evident during its continuance. The pulse is usually at first small and feeble, but gradually becomes fuller, stronger, and slower as the shock passes off. The temperature is found at first to be low, 96·8° F., afterwards normal, 98·5°, so continuing if recovery is to be complete; but if a fatal result is to ensue, it rises to 104° F. or 106° F.

Respiration is embarrassed, slow, and sometimes irregular. In all the severer forms it is markedly laborious, and accompanied by stertor, and frequently foam or

frothy saliva is blown from the mouth with considerable force. This latter symptom is justly considered an indication of great danger.

The "Cheyne-Stokes" respiration is sometimes observed. This respiration is marked by a series of respirations, becoming shallower and shallower until it altogether ceases; then after a long pause the series begins again, and the respirations again grow deeper and deeper until the maximum is once more reached.

The face is generally pale and the skin is warm, and bathed in perspiration, but in very bad cases a cold clammy sweat is observed. The teeth are closely clenched, and the power of swallowing, though not completely lost, is for the most part so much impeded as to oppose serious obstacles to the administration of remedies. Older writers state that the pupils are permanently dilated. In the worst cases they will not respond to light, and in others they do so, but in a sluggish manner. The duration of the apoplectic fit lasts from two or three hours to as many days; about thirty hours may be considered an average. When perfect coma exists, attended with all the symptoms mentioned, the case ends fatally; but when a recovery ensues, either perfect, temporary, or partial, it will usually be observed that the symptoms mentioned are not severe; that the breathing is not stertorous; that the pupil does react to light; that sensation is not completely lost, for instance, there is an evidence of feeling when the limb is grasped.

Under such circumstances the prognosis is more favourable, but it is still to be remembered that it is rarely complete, and a relapse may at any time supervene. Recovery, moreover, is often associated with incurable hemiplegia, with loss of memory or of speech, and the capacity for mental or physical efforts is never what it was previous to the attack.

Prognosis.—The prognosis must in every case be very guarded and based on the total or partial coma which exists. As a general rule it may be said that in severe seizures death occurs in a few hours; in the less severe,

about one-third of those attacked die at varying intervals; while in mild cases the prognosis is more favourable when the eighth day is passed without a relapse.

Treatment.—If there are any forewarnings, the bowels should be opened by a brisk purgative; the patient should be kept in bed, with his head cool and well raised; every mental strain should be avoided, and thirty grains of the bromide of potassium ordered at night to secure rest. If the patient is seen early in the course of the fit, if he is robust and plethoric, if his face is deeply congested, if there is visible pulsation of the carotids, and if the pulse is full and slow, then in all probability increased arterial tension continues, and to obviate this venesection is the most speedy and effective remedy. We cannot by this means remove the blood already effused, but we may prevent further effusion by lessening the tension of the cranial vessels. Blood should be drawn from the arm to the extent of one or two pounds. If evidence of increased arterial tension does not exist, or if the patient is not seen at an early stage of the attack, then it is inadvisable to bleed, but rather to put in force means which the course of the shock indicates. Thus the bowels should be emptied by enemata, if the clenching of the teeth prevents the administration of croton oil; the urine, if not passed naturally, should be drawn off with a catheter, and if the hæmorrhage still seems to be going on, a hypodermic injection of ergotin should be tried. Rest in bed, with the head and shoulders elevated, is also essential. We can only treat symptoms until all danger from the shock is over. Thus bromide of potassium may be given to produce rest, the daily evacuation of the bowels seen to, and the tendency to recovery should not be interfered with by allowing friends to enter the room and by fussy inquiries as to his condition. After three or four weeks remedial measures should be adopted to restore the power of motion, and to prevent contractions. The agents best suited for this purpose are strychnine or phosphorus, and the use of the constant current or massage by an experienced masseur or masseuse.

Dietetic and Climatic Treatment.—A low diet is generally necessary after an apoplectic seizure. Farinaceous food, animal jellies, weak infusions of flesh, fish and vegetables (pot-herbs) may be taken. Alcohol and animal food are forbidden. Sometimes there are cases where the pulse is weak and exhaustion pronounced, and in such instances food should be given in small quantities, and concentrated as much as possible. In the hemiplegia which follows on apoplexy, certain health-resorts, as Wildbad, Ragatz, Teplitz, Bath, and Wiesbaden, are specially useful. When circumstances prevent a patient going to these places, warm baths at a temperature of 96° F. may be taken, medicated with common salt, three or four times in the week, and should be followed by massage.

Cerebral Anæmia—*Etiology.*—This condition may be brought about by influences which act on the circulation of the brain alone; or it may be combined with a general anæmia, which affects the whole body. Again, the cerebral anæmia may affect the whole brain, or it may be limited to certain parts. The former condition is by far more common. Further, according as the anæmia is produced suddenly or gradually, so also do the clinical symptoms vary. With reference to the above statements we may allude to certain well-known circumstances connected with universal cerebral anæmia. In difficult labours, when finished, syncope sometimes occurs, by the rush of blood to the abdominal vessels, which are relieved from the pressure previously exerted on them. Similarly syncope may follow on the too rapid withdrawal of ascitic fluid when tapping is performed. Cerebral anæmia may arise from insufficient, feeble energy of the heart's action. Thus a person recovering from fever or diphtheria faints when the erect posture is assumed, because the heart's action is too feeble to send the necessary quantity of blood to the brain. Mental impressions may also produce fainting, by irritation of the vagus, causing a diminution of the supply of blood to the brain.

Insufficient nourishment or prolonged lactation may also occasion cerebral anæmia.

Circumscribed partial cerebral anæmia may result from emboli or thrombi in the cranial vessels, or from local spasms, as in hemicrania or the *petit mal* of epilepsy.

Pathological Anatomy. — Anæmia of the brain is characterised anatomically by the pale colour of the organ. This is most evident in the gray substance, which is sometimes perfectly colourless, or has a dirty grayish appearance. Even in the white substance the surface looks whiter than normal, and there is an absence of the usual blood-points. A certain quantity of blood is found in the larger veins and sinuses, but in the membranes, as in the cerebral substance, the amount of blood is diminished.

Symptoms.—Giddiness, ringing and buzzing in the ears, paleness of the face, loss of consciousness, characterise the *slighter* forms of cerebral anæmia, as is exhibited by the faintness which sometimes attacks a medical student on his first sight of an operation. The *graver* forms may be due to sudden hæmorrhage, and may be attended with convulsions and coma. The state of the pupils is first one of contraction, next of dilatation, and finally they return to the normal condition if the issue is to be favourable. By many authorities death from sudden shock is ascribed to cerebral anæmia.

Treatment.—The line of treatment in cerebral anæmia, when it culminates in syncope, is to give the head a position relatively low to the rest of the body. This should always be attended to, but if the symptoms are severe and persistent, then irritation of the skin by sprinkling the face with cold water, or by the metallic electric brush, is necessary. The nerves of the mucous membrane of the nose should also be stimulated by the inhalation of the preparations of ammonium, or irritating enemata containing salt and water. If the pulse be very weak, cardiac stimulants should be employed, as alcohol or ether. As a last resort transfusion may be tried.

Cerebral Hyperæmia (*Synonym*, Cerebral Congestion).—This is an affection of decided importance, although doubts have been thrown on the possibility of its occurrence. It may be considered either active or passive.

Etiology.—In *acute* hyperæmia the chief cause exists in increased activity of the heart, as from hypertrophy; or when a normal heart is disturbed by emotion or excitement. Prolonged and increased mental activity is usually and justly regarded as a cause of cerebral hyperæmia, but in what manner it produces this there is no direct chain of evidence to show. It may also occur at the change of life in females, or in either sex through the stoppage of hæmorrhage from piles. *Passive* hyperæmia is observed in certain diseases of the lungs, as emphysema or large pleuritic effusions, or in diseases of the heart, as in the last stage of aortic or mitral incompetency; all forced expiratory movements with closed glottis, as severe coughing, violent screaming, long-continued blowing of wind instruments, powerful compression of the contents of the abdomen (such as occurs in efforts to empty constipated bowels, or during childbirth), are also recognised as being factors in this form of the affection.

Pathological Anatomy.—Certain post-mortem appearances, which may, however, be all or in part absent, are observed. In the active form, the capillaries and large blood-vessels of the brain and pia mater are increased in size; hence the blood-points are observed to be larger and more numerous than usual, while the pia mater has a red or rose-coloured appearance either in spots or throughout its whole extent. The gray matter is red or violet in hue, the choroid plexuses are enlarged, and the ventricles contain an excessive amount of fluid. In the passive form, when the quantity of venous blood is augmented, the veins generally are distended.

Symptoms.—In the *active* form, there are pain, dizziness, and confusion of the intellect, which may last from half an hour to two or three days; sleeplessness, irritability of temper, and inability to do any mental work,

with a sense of flying heat shooting over the head and neck, and redness of the face, are also prominent symptoms. In the *passive* form, there is the same confusion of ideas, but with mental torpor instead of irritability, and drowsiness instead of sleeplessness. In the very severe forms, there may be loss of consciousness, delirium, or convulsions. The slight forms are rarely dangerous in themselves, and may be recovered from under treatment. In the severe forms the prognosis is grave, and when death occurs it is due to coma. Cerebral hyperæmia or congestion is now not uncommon, in a more or less pronounced form, in mercantile and professional life.

Treatment.—Its premonitory symptoms demand mental rest, with abstinence from work; and this rest may be aided by the liquid extract of ergot (x. to xxx. m. thrice daily), or bromide of potassium, by sleeping with the head high, and avoidance of alcoholic stimulants in every form. Exposure to the sun and variations of temperature are also to be shunned. Purgatives, and especially quickly acting purgatives, play an important part in treatment. Croton oil, salines, or irritating enemata may be employed (F. 24). Diuretics also do good, as acetate of potassium (F. 37). If the pulse be feeble, tincture of digitalis in small doses (4 to 5 minims thrice daily) is beneficial; or "Warburg's tincture," a special preparation of quinine, in teaspoonful doses before breakfast.

Dietetics and Climate.—Diet should be carefully attended to. Highly spiced dishes are countermanded—the plainer the fare the better the digestion. Dinner should consist of fish; white meat, as poultry, mutton, or veal; and bread or rice puddings. Alcoholic drinks and coffee should be avoided, but weak tea in moderate quantity may be taken. For the first four or five months after an attack, an absolutely quiet life is necessary, with cessation from work and mental annoyance. Afterwards a sea voyage does good, or a change of climate, where the altitude is not high, as at Wildbad or Rippoldsau. Health resorts at high altitudes induce sleeplessness.

Cerebral Syphilis.—Cerebral syphilis has only been scientifically known since 1861, when Leon Gros and Lancereaux published monographs on the subject. During the last fifteen years, especially in this country, many investigations on the subject have been conducted, so that more light shines on what was considered a dark domain of this phase of syphilis. The conditions under which the nervous system is particularly affected will now be briefly alluded to.

1. It is not until syphilis has lasted for some years that a syphilitic growth is developed in the nervous system. It may be reckoned among secondary, or rather tertiary affections, and it is doubtful if it should ever occur were the treatment not hesitating and incomplete. It is probable that an unstable nervous equilibrium favours the previous factor mentioned, aided by severe mental labour, or other great strains on the constitution. Nerve syphilis in either sex, further, occurs at every age at which the constitutional affection can be present.

Pathology.—The most frequent change is the formation of the syphiloma or gummatous tumour. It occurs in two forms—as a whitish transparent moist gray mass, of the consistency of firm jelly, of irregular form, having on its surface a scanty whitish red juice, and gradually blending with the surrounding tissues ; or as a yellow dry friable substance often as firm as cartilage. It has two favourite seats, usually at the circumference, and especially at the base of the brain in the subarachnoid space. Syphilis may also occur in the great arteries at the base, and there may be syphilitic inflammation partly of the membranes and partly of the brain substance.

Symptoms.—The most striking symptom is headache, never absent, yet varying in severity from time to time, and generally acutely felt at one spot, from which it appears to radiate. This pain at the particular place is made worse by pressure. Besides the headache there is permanent or often recurring sleeplessness. With the headache and sleeplessness there are various symptoms of mental disturbance, as dizziness, irritability of temper,

which sometimes pass on, after varying intervals, into melancholy or mania, rapidly followed by a marked weakness of intellect and memory. Certain pareses now appear, notably what the French aptly term "embarras de parole," and unilateral paralysis of some part of the body, as the face, arm, or leg. If no suitable treatment be instituted, epileptic seizures become frequent, or genuine apoplectic attacks, with succeeding hemiplegia, and generally at the same time paralyses of the cerebral nerves. These separate attacks come nearer and nearer together, the paralyses increase, somnolence becomes pronounced, and passes into coma, which, in almost all forms of cerebral syphilis, precedes the fatal issue by days or weeks. The course of cerebral syphilitic disease in some cases is similar to that of general paralysis of the insane. See p. 535.

Diagnosis.—The most important diagnostic criterion in every case of doubt between cerebral syphilis and other cerebral affections with similar symptoms is the demonstration of the cause—that is, a previous infection with syphilis. Hence the history of the case, and the examination of the person for enlarged glands, scars on the skin or mucous membranes, must be carefully attended to. In all doubtful cases, especially in middle-aged adults, there is nothing to lose but much to gain by prescribing remedies known to do good in syphilis.

Treatment.—The treatment should be distinctly and decidedly mercurial, and experience has shown that in cerebral syphilis inunction with mercurial ointment is the most satisfactory method. At least a drachm should be rubbed in every day, and continued until its action on the system is apparent. In some cases improvement appears after the fourth or fifth day. If, after 20 or 30 drachms have been used, there is no benefit, then the inunction should be stopped, as after that time there is little prospect of its doing good, and this is in all probability due to a wrong diagnosis having been made. Iodide of potassium alone may succeed in headache or oculo-motor paralysis, but it is an utterly inefficient substitute for mercury in the graver forms of the disease.

Dietetics.—Unless the patient is plethoric, which is rarely the case, the diet should be generous, and not restricted.

For convenience of description, we shall now speak of Apoplexy, Hemiplegia, and Aphasia.

Apoplexy (*Synonym*, Stroke) is a term significant of a stroke, a beating down suddenly, with coma as a leading feature. Coma may be due to external injuries of the head, to internal lesions, to diseases emanating from the brain, to narcotic poisoning, or to drunkenness, and therefore it is of the utmost importance that a diagnosis should, if possible, be clearly established, as otherwise serious mistakes may occur. In all cases the history will form a marked determining distinction, and especially is this true in the last two; for, if dependent on epilepsy, the attack will not be long and there will be an account of former seizures; if due to concussion, there may be injuries or bruises on other parts of the body, probably bleeding from the ears or nose, and other circumstances tending to the supposition that the insensibility is due to injury wilfully or accidentally inflicted. In drunkenness the patient can be aroused to some extent, the pupils are dilated and react to light; there is no hemiplegia, and the smell of the breath will betray alcohol. As drunkenness and an apoplectic seizure may, however, exist together, the diagnosis should be guarded; and, if a doubt exists, it is better to err on the safe side and act as if they were combined. In uræmia there is no hemiplegia; the urine, if drawn off by a catheter, will be found to be albuminous; and there will in all probability be indications of dropsy in other parts of the body.

In opium-poisoning the pupils are contracted, there is no hemiplegia, and there are no remissions in the insensibility, but, on the contrary, deepening coma.

In all doubtful cases it is advisable to use the stomach-pump.

Treatment.—See Cerebral Hæmorrhage, p. 485.

Hemiplegia.—This is generally spoken of as "a para-

lytic stroke"; and, though it may be associated with many of the affections previously mentioned, it is most commonly due to hæmorrhage into the brain-substance. As the result of this or of some of the other cerebral diseases, the left side of the body is most commonly found paralysed, although the actual seat of the lesion in the brain is on the right side in the great majority of cases. The decussation of the pyramids accounts for this phenomenon. Owing to the affection of the facial nerve, the cheek hangs loosely with the angle of the mouth slightly drawn upwards to the sound side; and the tip of the tongue, by the action of the healthy hypoglossal, is pushed to the paralysed side when it is protruded, the counterbalancing power of the corresponding muscles being lost. The articulation is imperfect, and, if the third nerve is also involved, the upper eyelid droops, the pupil is dilated, and there is a divergent squint. The loss of motion may be complete in the arm and leg, and the patient lies in bed helpless. If it is partial, or if the original attack is being recovered from, the gait is peculiar, the affected leg being drawn after the sound one in a shuffling way, with the toes pointed to the ground, if the patient is able to lift the foot so far. In most cases there is loss of sensibility as well as motion.

Hemiplegia may be permanent, or it may tend to recovery, which commences in the leg.

After-effects.—Hemiplegia is often recovered from, and, as a rule, the legs recover before the arms. But hemiplegia may be permanent, and the affected muscles of the arm or leg may pass into a state of contraction, which is usually termed "late rigidity." At the arm it generally consists in a flexion of the various joints—thus the elbow is bent at a right angle, the wrist is pronated and folded on the forearm, and the fingers are drawn in upon the palm of the hands. The leg is less apt to become contracted than the arm, even when it remains paralysed, but there may be flexion at the hip and knee joints. The cause of "late rigidity" has given rise to considerable controversy. The idea that it was due to

slow contraction of an apoplectic cyst, or to a chronic inflammation in the substance of the brain, has been abandoned, and two theories now have advocates. (1) Bouchard and Charcot believe that sclerosis develops at the seat of the lesion, and entails a degeneration of the nerve fibres which pass down the cord from the brain in the lateral columns. These lateral columns, however, contain a number of nerve fibres, probably arising from spinal nuclei, unaffected by the degeneration, and these unaltered fibres are irritated and cause "late rigidity." Charcot, however, maintains that not merely the lateral columns, but also the anterior and posterior gray cornua, are affected, and produce in the former case atrophy in the muscles, in the latter partial anæsthesia. (2) Hitzig's theory is drawn from what is observed in hemiplegic limbs after a night's sleep. They are supple and they are flaccid. But if the patient exerts the sound limb, as by getting out of bed, then contraction and rigidity of the paralysed muscles follow. He instances also as corroborative proof a fact well known, that the hemiplegic arm of a patient, which he is unable to move voluntarily, may be jerked into the air when he yawns or stretches himself. He assumes that the spinal centres are in a state of irritation, and that the "contractions of hemiplegic limbs represent an excess of those co-ordinated movements in distant parts which naturally accompany every action of the body."

Without attempting to favour any of the opinions alluded to, we may affirm that the seat and nature of some spasmodic affections following on hemiplegia are still unknown. They are recognised by their symptoms, which, however, vary in different cases. Sometimes a tremor is occasioned by the effort to perform some voluntary act, or it may be observed when the part is at rest. Sometimes the spasms of the limbs affected are choreiform in character, and to these has been applied the term Post-hemiplegic Chorea. Sometimes the parts connected with the spasms cannot be kept still. They are constantly moving, except during sleep, and

hence Dr. Hammond of New York designated this continual motion ATHETOSIS (ἄθετος, without a fixed position). The fingers are alternately flexed and extended, and the same lack of repose is observed on the toes.

Treatment.—See Cerebral Hæmorrhage, p. 485.

APHASIA.—The term aphasia means loss of *speech*. It does not mean loss of voice—aphonia—which is due to an affection of the laryngeal muscles; nor impediment of articulation, as at the onset of hemiplegia; nor the thick and blurred speech of bulbar paralysis, due to imperfection in the movements of the tongue and palate; nor the silence apparent in mental disease independent of demonstrable lesions of the cerebral centres.

Aphasia is as a rule due to a lesion on the left side of the brain, such as embolic softening or hæmorrhage, and consequently, if associated with hemiplegia, the hemiplegia is of the right, not the left side. This fact clearly indicates that the left, not the right side of the brain is alone or chiefly educated for the process of speech, and this deduction is strengthened by finding in the rare cases of aphasia connected with left hemiplegia that the patients were left-handed, the right side of their brain being that concerned in speech.

In aphasia the patient may be altogether mute, or if he can utter a word at all, he does so clearly and distinctly; or he may possess the power of uttering two or three words or short sentences, often in contradiction to his real meaning, and in answer to every question that may be put to him.

If there be a more extensive vocabulary, the patient is very apt to use one word for another, and this seems due to the similarity of sound—thus *purging* takes the place of *perjury*, *dispersion* is used for *dispensary*. In such an instance grammatical form is always observed. Substantives are used in the place of substantives, verbs for verbs, numerals for numerals.

In some but not in all cases of aphasia the patient loses the power of expressing himself in other ways as well as in speech. Thus he cannot write, and the in-

capacity to do this is termed "*agraphia.*" Yet exceptional cases occur, where a person who cannot speak has yet the power to express in writing his ideas correctly, or the condition may be reversed; for the capacity to speak may be little affected, while the impairment of the power to write is very marked.

It is important to notice that the very words which an aphasic patient is unable to utter may be perfectly understood by him when spoken by another.

It has been established within the last few years, chiefly owing to the publication of a case by M. Broca in 1861, that aphasia, and agraphia when that also is present, is almost invariably dependent upon a lesion of the left side of the brain, and that the exact position of the lesion is in the posterior third of the second, and that of the third left frontal convolution. Hence the third left frontal convolution is nominated in cerebral pathology *Broca's Convolution* or lobe.

Understanding, therefore, by aphasia the loss of outgoing language, and the relation of this to Broca's convolution, we can name this *motor aphasia.* We have, however, to go further, and consider its relations to that part of the faculty of speech, incoming language, which is largely dependent upon the functions of sight or hearing, and which is termed *sensory aphasia.* The explanation of this term is more clearly seen by the following statements.

It is well known that when aphasia is incomplete, so that the patient can utter one or two words, he is often perfectly conscious of the mistake he commits. He looks puzzled, he shakes his head, and if by chance the right word comes off the tongue a smile of satisfaction lights his face. It is also on record that a person unable to speak or write may seem to understand all that he reads and all that is spoken to him. He is not entirely bereft of intelligence. This fact should not be minimised, and the practical question therefore is, not what degree of defect of understanding may be found in aphasic patients, but what amount of intelligence they are capable of retaining, or of being educated to retain.

Though loss of speech is often associated with the inability to understand "incoming language" or to recognise mistakes made in "outgoing language," yet the two things, motor and sensory aphasia, are essentially independent of one another, and sensory aphasia indicates the existence of a lesion extending far beyond Broca's convolution. The site of sensory aphasia, if associated with word-blindness, is situated at the visual centre, if with word-deafness at the auditory centre (see woodcut, p. 413). Broca's theory may be firmly held so far as concerns the lesions which are attended with aphasia when it occurs independent of any failure of intelligence. This theory is, however, very far from implying that the whole faculty of language is localised in any one part of the hemispheres. It only asserts that a certain part in the left hemisphere contains machinery without the use of which a person cannot utter words, nor indeed convey his thoughts to the pen in writing.

Treatment.—Without entering into details we may say that recovery, or, at any rate, improvement of speech, may occur, even in organic lesions, from education of the right hemisphere. The process is necessarily slow, and must be aided by mental and bodily rest, with careful attention to digestion in selected articles of food. In the majority of cases, however, the issue is not hopeful, yet when aphasia depends, as it sometimes does, not upon organic lesions but on functional disturbances, as migraine and right-sided convulsions, we have more confidence in expecting recovery.

ABSCESS OF THE BRAIN is, in comparison with other cerebral affections, a rare occurrence. It is seldom or never a primary affection, but is the result chiefly of DISEASES OF THE EAR, especially suppurative inflammation of the tympanum; less frequently of CHRONIC DISEASE OF THE NOSE or following on PYÆMIA. In surgical practice it is recognised as starting from blows or falls. Before destroying the life of the patient an abscess of the brain attains a size often as large as a hen's

egg, and when secondary to ear disease pus from the abscess may be discharged externally through the auditory meatus ; if secondary to disease of the nose it may break through the ethmoid bone ; if dependent on injuries the pus formed within the hemisphere goes inwards towards the lateral ventricle.

Symptoms.—Pain is the earliest symptom, and this pain is intense, agonising, and continuous—rarely being intermittent. *Rigors* with *convulsions* follow, and the body becomes rapidly emaciated. The *pupils* are sluggish and the pulse slow. One part of the brain may be the seat of disease more than another, and "localising symptoms" then are evidenced (see p. 414). Thus aphasia may be present ; or hemiplegia, partial or complete ; or monoplegic paralysis affecting the face and tongue. The terminal stage of a cerebral abscess is seldom of long duration, death coming on suddenly, or with coma.

Softening of the Brain.—This term, softening of the brain, is familiarly used to indicate affections of the brain where intellectual vigour fails in a previously healthy person. It is questionable whether it ever occurs as a primary and independent process. Red softening as the result of injury, tubercular meningitis, cerebral hæmorrhage, or of embolism or thrombosis, is, however, recognised by (*a*) the colour of the brain being altered from gray to red ; (*b*) by an evident change of its natural consistence, the elements of the brain being softened and granular ; (*c*) by no products being observed characteristic of inflammation (Moxon).

Hydrocephalus of Childhood.—This is commonly termed "water on the brain," and not unaptly, because it consists essentially of an accumulation of fluid in the ventricles, or in and beneath the arachnoid. The head is, in consequence, altered in form and enlarged in size. The fontanelles are open, the forehead is prominent, and the face and body appear thin and wasted. With such signs it can hardly be mistaken for any other disease.

In many cases it is congenital or is detected about the sixth month, and lasts for a varying term of months or years, death occurring with coma or convulsions, or by an intercurrent malady, as measles or hooping-cough. Occasionally, if the quantity of fluid is not large, recovery takes place, but in all cases of partial or complete recovery there is a tendency for the disease to come back.

Treatment.—Compression of the head, with a band of elastic webbing two or three inches wide, seems serviceable, care being taken to shift the webbing from time to time; and if this mode of treatment fails, then paracentesis of the head, with a fine trocar at the outer angle of the great fontanelle, may be performed, withdrawing only two or three ounces at a time. If the result seems favourable the same operation may be done from time to time, with a bandage applied afterwards. Cases have been recorded where hyd. c. cretâ in small doses, followed by iron, was beneficial. Any tendency to hydrocephalus should be met by fresh air, cod-liver oil, and strengthening diet. If recovery takes place, all attempts to exercise the brain too soon should be discouraged.

HEAT-STROKE and *Coup de soleil* are synonyms applied to a disease prevalent in warm climates, but occurring also in this country. Two forms are observed,—one in which the disease is due to the direct influence of the sun's rays, the person being struck down suddenly, with stertorous breathing, slow, full pulse, unconsciousness, and marked heat of the head. In the other form, excessive heat without exposure to the sun may, by some blood-change, produce phenomena similar to syncope, with weak pulse and no stertor of the breathing.

Nothing characteristic is detected in the brain after death.

Treatment.—Apply ice or iced water freely to the head, which should be raised. Afterwards leech or cup behind the ears, and administer a purgative enema for the first form, the true *coup de soleil.* For the second, cool the body by means of cold douches; afterwards apply sinapisms to the spine, epigastrium, and limbs; and

administer stimulants. Inject quinine hypodermically (see F. 11*d*).

TUMOURS OF THE BRAIN.—By these are meant tumours of the cerebrum and cerebellum, of the pons and the medulla oblongata. These tumours appear more frequently in males than females, the proportion being as 10 to 6. This is probably due to men being more apt, from occupation or accident, to receive injuries of the skull, which, although not considered serious at the time, ultimately give rise to tumours; and also to their greater abuse of stimulants.

Pathology.—Some of the tumours occurring in the brain are more or less peculiar to it, while others are similar in their composition to those found in other parts of the body. In the first group is glioma, formed by the proliferation of the neuroglia and hyperplasia of the pineal gland. In the second group are the tubercular tumours, most frequently situated in the gray substance, especially of the cerebellum, occurring usually in childhood, sometimes single and often multiple; carcinoma, as fungus hæmatodes, originating from the outer or inner surface of the dura mater, and spreading outwards and inwards; sarcoma, in a variety of forms; intracranial aneurysms, found usually upon the large vessels at the base of the brain, arising in consequence of atheroma or without this.

Symptoms.—The most prominent symptom is headache, the pain of which may be dull and aching or excruciating. Between these extremes there are degrees of intensity. Giddiness, irritability of temper, loss of memory, and general mental feebleness also come on sooner or later, and the end is ushered in with stupor and coma. Vomiting without nausea is also a frequent symptom, and also constipation. Changes in the optic disc are detected by the ophthalmoscope—the condition being termed "the choked disc," on account of the redness and swelling of the papilla, or there may be neuro-retinitis. These affections pass into atrophy of the disc and progressive impairment of the sight.

Diagnosis and Treatment.—The ophthalmoscopic examination revealing any of the changes described, in addition to the other cerebral symptoms, separates plainly cerebral tumours from the merely functional disturbances of hysteria. Further, if the patient be a child, the supposition is tubercle, and the older the patient is the greater the probability is that the tumour is not tubercular. Above the age of forty tubercle may be left out of the question, and the diagnosis is between malignant and syphilitic tumour. If circumstances point to the latter a course of mercury should be unhesitatingly adopted, as in Cerebral Syphilis, p. 493.

DISEASES OF THE MEMBRANES OF THE BRAIN

Diseases of the Cerebral Membranes.—Hæmatoma of the dura mater is the name given to effusions of blood found on the inner surface of the dura mater, within the so-called arachnoid cavity. Virchow believed that the earliest change was inflammation of the dura mater (Pachymeningitis), and that the hæmorrhage was only secondary. But later investigations of Huguenin seem to show that it depends on an affection of the walls of the blood-vessels, which diminishes their power of resistance, and that hæmorrhage is the initial change. The mildest forms present a membrane of a delicate interstitial tissue, reddish in colour, upon the inner surface of the dura mater. In more advanced cases there are several layers of membrane, the newest and most superficial being nearest the brain, the oldest in apposition with the dura mater composed of connective tissue rather firm and fibrous. The hæmorrhage always takes place inside the mass or between its layers; if it breaks through the innermost layer, so that the blood flows into the arachnoid spaces, the result is known as intermeningeal apoplexy. It has been found without

attendant symptoms at the autopsy of typhoid fever, small-pox, in chronic cardiac and pulmonary diseases, but more especially is it common at post-mortem examinations of general paralysis of the insane, and of chronic alcoholism. It is a disease of advanced life, more common to males than females. The diagnosis is very difficult, and is only problematical, when in cases of chronic cerebral disease, as those mentioned, there is a sudden attack of the nature of apoplexy, with the abrupt appearance of symptoms of coma, unilateral convulsions, monoplegic paresis, contractions, and contracted pupils.

Treatment.—In a supposed case of hæmatoma ice should be applied to the head, purgatives administered, and local depletion by leeches on the temples or behind the ears.

Acute Simple Cerebral Meningitis.—The distinct names given to acute simple inflammation of the membranes of the brain, according as the convexity or the base is affected, and according as the disease is associated with different causes, have much plausibility in theory, but they lead to confusion in the mind of the student. We will, therefore, attempt to describe the inflammation as a whole, and not with reference to a separate nomenclature.

Pathology.—If the inflammation has been very severe, we find on a post-mortem examination, after turning back the dura mater, that the convolutions of the brain are covered by green purulent material, which, in the majority of cases, is also present within the meshes of the pia mater. The investing membrane of the brain also will be greatly swollen, while in slighter cases this will be hardly apparent, only pus being found at limited sites. Sometimes the convolutions are softened, and when the pia mater is stripped off a ragged surface is exposed to view. The increased pressure which precedes death empties the vessels, and the ventricles may contain pus.

Etiology.—The causes are many. Surgical injuries, extension of inflammation from chronic disease of the skull or first two cervical vertebræ or of the ear, suppuration of the eyeball, etc., may induce the inflammation; or it

may be due to metastasis; it may be secondary to acute disease, as pyæmia, typhus fever, bad cases of pneumonia or pleurisy, or to syphilitic gumma, or may arise from direct action of the sun's rays on the head, or from unknown causes.

Symptoms.—The attack is sudden, attended with piercing headache, intolerable agony, vomiting, and extreme irritability to light and sound. The eyes are red, the pupils contracted, the face flushed, and the head hot. The temperature on the third day may reach 103° F., and then also delirium is marked. This may be considered a stage of irritation, and is followed by a stage of pressure, with spasms or convulsions or paralysis, involuntary passage of evacuations, and finally death by coma.

Duration.—In very severe cases death occurs in forty-eight hours or three days, or, in less intense cases, the disease may last for a week or more, and in rare instances terminates in recovery.

Treatment.—(1) Shave the scalp, and apply to it ice in a bladder; (2) leeches behind the ear, and cupping glasses to the spine; (3) administer calomel, or rub in unguent. hydrarg. Wash out the mouth with a solution of chlorate of potassium to prevent the gums being affected. The treatment thus mentioned is for a case of a child or young person suffering from acute meningitis alone. In such cases the diagnosis is not doubtful. In an adult there might be a possibility of cerebral syphilis, but the treatment would be good in both affections. When it is secondary to other affections, as pyæmia, or where the diagnosis is not certain, iodide of potassium and small doses of perchloride of mercury should be tried.

Tubercular Meningitis (*Synonym*, Acute Hydrocephalus) is a disease not uncommon in children under five years. The ventricles are found distended with serum, and the convolutions are much flattened. This characteristic appearance in post-mortem examinations led to its being called "acute hydrocephalus," before it was understood that its essential causes were the tubercles.

Gray miliary tubercles are formed at the base of the brain, and the presence of these excites inflammation of the membranes along the course of the middle meningeal artery and its branches. These tubercles may be so minute as to defy detection unless a microscopical examination is made; they may be so abundant as to form large granular masses; or they may blend into cheesy patches of considerable extent and thickness. They appear to originate in the perivascular lymphatic sheaths of the small cerebral arteries, and they invade and partially block up the channels. Hence, intense hyperæmia is caused in collateral vessels, and the pia mater at the base of the brain is very vascular. The disease always terminates fatally.

Symptoms.—Tubercular meningitis is preceded by signs of failing health for some weeks or months before the attack sets in, which it does generally with obstinate vomiting and intense pain in the head. The child screams, the belly is drawn in, and there is great intolerance of light and sound. The temperature varies from 101° to 103° F. This may be called the stage of excitement, which lasts from seven to fourteen days, and is succeeded by a stage of depression with a strong tendency to sleep. The child lies quietly on its back, its pupils are dilated, and it takes no notice of external objects. Occasionally there is a peculiar scream called the hydrocephalic cry. Respiration is irregular and sighing, pulse low, temperature subnormal, and bowels constipated. This stage may last from two or three days to as many weeks, and is followed by a stage of paralysis, characterised by the temperature again rising above the normal, by frequent and possibly violent convulsions, heavy dull eyes, paralysis, and coma.

In accordance with the pathology of the disease advanced, it may, generally speaking, be stated that the first stage, that of excitement, depends on the implication of the pia mater at the base of the brain; the second stage, that of depression, on the development of the hydrocephalic effusion; the third stage, that of paralysis,

on the gradual paralysis of the centres in the medulla oblongata. Convulsions, to a greater or less extent, may also be present during the whole course of the disease, and cannot be referred to any one stage. Tubercular meningitis in its later stages simulates no other disease, yet at first it may be mistaken for typhoid fever more readily than anything else.

Tubercular Meningitis in Adults.—Tubercular meningitis in adults may occur in cases of phthisis, but it may also be seen, fortunately not often, independent of that disease, commencing, as a rule, gradually and insidiously; sometimes, however, being ushered in by convulsions or by well-marked local paralysis, as of the facial nerve, or by hemiplegia. If it commences insidiously, it may be mistaken for typhoid fever; and if suddenly, with no paralytic symptoms, it may be ascribed to hysteria. The diagnosis in such cases is difficult, and in some instances can only be solved by time and the development of the disease. Important evidence, confirmatory or otherwise, may be obtained—(1) from heredity as to tubercular disease; (2) or disease of lungs, or of strumous affections of the bones or joints. Not infrequently the autopsy belies all forecasts, and teaches observers to be very guarded. Tubercular meningitis is one of the most fatal of all diseases, while diseases with which it may be confounded, as typhoid fever, mania, delirium tremens, or hysteria, as a rule tend to recovery. It is necessary to remember that comparatively seldom are there any marked prodromata in adults, and in this respect it notably differs from the same disease in children.

Treatment.—The treatment of tubercular meningitis, either in children or adults, is hopeless, for tubercles cannot be absorbed. In doubtful cases it is essential that the treatment should do no harm, and be purely expectant, until the particular disease in question has asserted itself. "Our effort should be to sustain life from hour to hour in the hope that the tide may turn" (Fagge).

Epidemic Meningitis, or Cerebro-Spinal Fever.—From time to time in various countries epidemics of a disease with a history of fever, various eruptions, and a number of cerebro-spinal symptoms, as rigidity of the neck or of the whole vertebral column, have been recorded. Hence the disease came to be named epidemic meningitis, or cerebro-spinal fever. While this disease has been known on the continent of Europe and the United States more or less since the beginning of this century, England and Scotland have been comparatively free from it. It has, however, been seen in Ireland in 1846 and 1848, and on both occasions caused many deaths.

Pathology.—Exudations of lymph or purulent deposits are found at the base and the convexity of the brain, and in the depressions and furrows of its surface. The spinal canal presents similar appearances, especially at the lower part and posterior surface. Congestion and œdema are also observed in the lungs, liver, spleen, and kidneys; and degeneration of the fibres of the voluntary muscles, especially of the back. The heart is relaxed, and the pericardium sometimes lined with pus.

Etiology.—There is no evidence of contagion, and mystery surrounds its cause. Males appear to be more often attacked than females—the age being rarely above forty, and rarely under twenty. In some epidemics children have alone been the victims. It occurs most frequently in the dwellings of the poor, where dirt and damp and bad ventilation prevail. In Ireland in 1846 it affected chiefly the workhouses, and in the United States the negroes.

Symptoms.—The attack is sudden and marked by shivering, pain in the head, vomiting, and rigidity of the muscles of the back of the neck. Extreme hyperæsthesia is a prominent symptom during the illness, the patient shouting out when his skin is touched, even although he may be comatose. The degree of fever is very variable, usually ranging from 100° to 103° F.; occasionally it is normal, and sometimes it rises in the end to 105° or 107°.

A peculiar petechial eruption is often present on the neck, breast, or limbs, of a red, purple, or black colour, the spots varying in size from a pin's head to three-quarters of an inch in diameter. The course of the disease is rapid, as some die within a few hours, many within twelve or twenty-four. The first four days are most dangerous; after that time there appears to be a fair prospect of recovery. About half of those attacked die.

Treatment is unsatisfactory. Stimulants are recommended from the outset, with the application of leeches behind the ears to relieve the headache, and ice to the spine and head to mitigate the spasm. Chloral and bromide of potassium, and the hypodermic injection of morphia, have been strongly urged; and its resemblance to malarial fever has suggested the use of quinine.

NEUROSES WITHOUT KNOWN ANATOMICAL BASIS

Chorea (*Synonym*, St. Vitus's Dance) literally means a dancing or jumping, being derived from the Greek word χορεία. It is the "Saint Vitus's dance" of this country, the "Veitstanz" of Germany, and "Saint Guy" of France. It may be defined as a disease most commonly affecting girls between the sixth and the sixteenth years, and characterised by irregular action and restlessness of the voluntary muscles of the face and limbs. It sometimes attacks boys. It may follow rheumatism, especially when this is a sequela of scarlet fever, and women are liable to it during their first pregnancy.

Etiology and Pathology.—All authorities who have carefully considered chorea seem to agree that the exciting cause is fright or some severe mental shock; but after this agreement ceases as to its site. So great is the divergence that some, notably in France, state that the disease is spinal, while in our country it is generally believed that it is seated in the sensory-motor ganglia, at the base of the brain, and especially in the corpora striata.

But as to the nature of the change in these, difference among our leading physicians again is apparent. Some have suggested embolism of the minute arteries in the region of one or both of the corpora striata; some have adopted primary or simultaneous endocarditis; some, unable to find a satisfactory anatomical basis, simply classify it as a neurosis. Since autopsies reveal absolutely nothing abnormal in the central nervous system of genuine chorea, we are inclined to accept, in the meantime, the agnostic view, and in adopting it we must remember that at the epoch of life when chorea occurs there is in young females an unstable and special activity of the sensory-motor ganglia. There is a condition of high tension. The fright or mental shock produces cerebral anæmia, which, momentary though it may be, is still sufficient to lower the functional vigour of the ganglia and originate the train of symptoms connected with chorea. This view accords with the special action of arsenic and nervine tonics upon the disease.

Symptoms.—In chorea there is power without control of muscular movements, so that there is an inability to keep at rest when awake or to perform in a satisfactory manner voluntary movements. If the patient means to sit or stand still, she (for it generally affects females) begins to fidget, and if she attempts to walk, there is no steady progress, but a halting and dragging of the feet over the floor. Even in sitting the hands do not remain steady, for one hand is laid palm upwards on her lap and suddenly reversed. On being asked to shake hands she attempts to do this, but firm pressure is supplanted by a wriggling, unsteady squeeze. Being requested to show her tongue, she appears unable to do so, and then suddenly protrudes it, and as suddenly withdraws it, with a snapping movement of the jaws. The articulation is also impeded, the respiration is irregular, and deglutition sometimes impaired. In severe cases she is unable to feed herself. Looking at her or drawing attention to her condition increases the irregular and purposeless movements. In a hospital a patient recovered from

chorea will relapse if she sees a case suffering from the same affection admitted into the ward. Often a blowing systolic murmur is heard over the cardiac region, and the cause of the murmur is differently explained. Some state that it is functional, some that it is due to choreic spasms of the musculi papillares interfering with the closure of the mitral valves, while others attribute its occurrence to endocarditis such as is seen in the course of rheumatism. During sleep the movements cease. If it attacks one side of the body it is termed hemichorea, and is then sometimes associated with hemianæsthesia.

The duration of the disease may, as a rule, be stated to be from two to three months, but it sometimes assumes a chronic form and lasts much longer. It seldom terminates fatally, except when, as rarely happens, it is very acute and complicated with other affections, as cholera or acute rheumatism.

In the fatal cases, which have occurred from the disease *per se*, the temperature was high, the spasms intense, and at last movements ceased with the supervention of a comatose state and involuntary passage of fæces and urine.

Treatment.—After the action of the bowels has been secured by an aperient mixture, and followed by an anthelmintic if there is any suspicion of worms, the patient should have a carefully-regulated, easily-digested diet; and, if unable to feed herself, should be assisted to do so. There seems to be, with few exceptions, a consensus of opinion as to the utility of arsenic in chorea. In the form of the liq. arsenicalis it should be prescribed in gradually increasing doses thrice daily until its physiological action appears, which usually occurs at the fourth week, and is attended by itching redness of the conjunctiva, dryness of the mouth, and a slight tendency to vomiting (F. 4). The medicine is now stopped, and is taken after a week or ten days in one-minim doses thrice daily for a fortnight. If there is evident anæmia, tinct. ferri perchlor. in six-minim doses should be given with an arsenical solution (liquor arsenicalis hydrochloricus).

In very acute cases, where a fatal issue may be feared from sheer exhaustion, chloral and bromide of potassium should be prescribed (F. 69), and if these means fail, the inhalation of chloroform should be tried for protracted periods; strong fluid nourishment in these cases, as milk, eggs, together with wine or brandy, is also essential to keep up the strength; sulphate of zinc is also spoken favourably of, in doses increasing from one or two grains three times a day to six, eight, or ten, till nausea is experienced, when in some cases the disease appears to be cut short. Antipyrin has recently been recommended, and cases have been recorded where benefit accrued.

EPILEPSY OR FALLING SICKNESS,

sometimes also popularly termed "fits."

No definition can be given of epilepsy, because no definition would embrace all its phenomena. Yet it may be stated generally to be a disease characterised by certain leading features, viz. sudden loss of consciousness and sensation with clonic spasms of the voluntary muscles, usually followed by exhaustion and coma. The essential element of epileptic paroxysms is loss of consciousness.

Etiology.—The tendency to epilepsy is often hereditary, but various other causes may be mentioned. Occurring often at puberty, it is justly considered in many cases to be a lamentable corollary of masturbation, of too early and frequent sexual intercourse, of malformations of the head, of the scrofulous diathesis, or it may be the direct result, either to himself or children, of an habitual drunkard's habits.

These are centric causes; while, as eccentric sympathetic causes, may be mentioned uterine derangements, irritation of teething in children, a disordered state of the stomach and intestines in males. Fright is a prominent exciting cause in a person predisposed to epilepsy. The first seizure occurs usually between the tenth and twentieth years.

Symptoms.—These are best divided into what occurs before, during, and after a fit.

Warnings of various kinds may precede the attack, such as spectral illusions, confusion of thought or speech, headache, dimness of vision, or what the patient describes as the indescribable sensation of an inward working. The most curious forerunner of a fit is what is termed the "epileptic aura or vapour." It seems to come from some distant part of the body, and patients describe it creeping along, as water may trickle or a serpent crawl, until it reaches the head or stomach, when consciousness is lost in the fit; or in contradistinction to this sensory aura there may be what is termed a "motor aura," recognised by twitching or palsy of some part of the body.

Describing epilepsy as seen in a male, we may say with or without these precursors, the fit is ushered in by a shrill cry and the patient falls down unconscious, struggling hard in convulsions. Unable to select a convenient place, he may fall in such a way as to hurt himself seriously. He gnashes his teeth, pushes out and often bites his tongue, foam gathers at his mouth, the forehead and eyebrows twitch, the eyes are partly open and partly shut, and the pupils are insensible to light and dilated.

The body writhes in convulsions, or is jerked from side to side, and what is popularly thought to be characteristic of the disease may be observed, viz. "the flexing of the fingers, and more especially the flexing of the thumb into the palm of the hand." The urine and fæces are often passed involuntarily, and a seminal emission may take place. The fierceness and alarming nature of the attack render minutes hours to the bystanders, as a fit averages only five to eight minutes in its duration, although it may last half an hour or more.

After perhaps a more sharp convulsive movement, there is deep sleep, from which he awakens with utter unconsciousness of what has occurred, with headache, red eyes, dilated pupils, and a peculiarly stupid expression of countenance. This is succeeded by seemingly restored health, but ultimately by other seizures, the interval

between the occurrence of which varies. Usually an interval of four or five weeks elapses, and this is followed by a series of fits, occurring at short intervals. Although epileptic attacks are not primarily fatal, yet gradually the constitution is sapped, the mental and bodily vigour impaired, and not unfrequently the unhappy victim of epilepsy ends his days in an asylum. We have described what is termed the "Grand Mal" with full paroxysms, but there is a form of epilepsy known as the "Petit Mal," in which the only characteristic sign is a loss of consciousness without any visible spasmodic effort, or at most accompanied by fixation of the eyeball. The time during which consciousness is lost is very brief, only from a few seconds to half a minute, yet in exceptional cases it may continue for three or four minutes. There is no forewarning: while eating the patient lets his spoon or knife drop, and his look becomes fixed. Sometimes this lasts only so long as to excite the attention of those around him, then he resumes taking food. While in the midst of talking, he suddenly stops; after a short absence of mind he takes up the thread of conversation. While walking on the street he stops still, but he need not necessarily fall if the arrest of consciousness is not prolonged; but on the other hand, if the absent-mindedness is longer, he may fall down, or, if riding, be thrown from his horse.

Pathology.—Should death occur during a paroxysm, the brain is found more or less congested, while, in long-standing cases, it may be softened or indurated and increased in weight. The researches of Schroeder Van der Kolk point to the medulla oblongata as the seat of the disease, that portion of the brain being supposed to be more excitable and sensitive, from an increased afflux of arterial blood, or from the accumulation in the system of some materies morbi, which leads to an explosion in the form of an epileptic fit. Hughlings Jackson and Ferrier have produced epileptiform fits in animals by galvanic stimulation of certain convolutions of the brain, which, if removed, do not cause paralysis, but yet, when stimu-

lated, give rise to these convulsions. Hence, epilepsy seems to these authorities to be an explosive lesion, like the discharge of a battery, although "we cannot say that an excess of energy is manifested, for we must take into account the energy required for constraint, which is taken away, and thus all energy is concentrated in the abnormal convulsion."

Brown-Séquard thinks that epilepsy is due to irritation of nerve-cells, which have their nutrition altered, and after a time acquire that morbid excitability which is the essence of the disease. He does not consider that it will ever be possible to recognise what cells are altered, as it is quite likely the change in them is more dynamical than physical. "That, however, the cells are located chiefly in the base of the brain," he considers, "is a conclusion borne out by many facts." At the same time he admits "that the spinal cord has a share in the production of epileptiform convulsions, and may help in producing in man an arrest of cerebral activity during a fit of epilepsy."

Treatment.—This consists of two points :—

1*st*, What to do during a convulsion, and 2*d*, after a convulsion.

1. When the fit occurs, the head should be placed in such a position that the tongue, which is then paralysed, should not fall back on the larynx and cover its aperture. Certain obvious duties are also necessary. The necktie should be loosened and the patient placed in such a position, with the head somewhat elevated, as to prevent his injuring himself against articles of furniture during the struggle. If it be possible, a piece of wood or india-rubber should be placed between the teeth, in order that the tongue may not be bitten. It is unnecessary to do more than what has been mentioned. Active measures do harm; the fit when begun cannot be successfully shortened, and it is thus better to wait until nature in due time recalls the patient to consciousness. It has been asserted that nitrite of amyl capsules broken and inhaled may avert an attack, and it is known that chloroform may stop it when it has occurred; but, if this is administered,

the patient is left more stupid and afflicted than if the natural outburst had been allowed to take place.

2. It is impossible to get rid of certain predispositions, such as a strumous diathesis, a misshapen head, or organic lesion of the brain and spinal cord. At the same time, some eccentric causes are remediable. If due to worms, give a vermifuge. If a syphilitic history exists, iodide of potassium and the bichloride of mercury are serviceable. If dependent on vicious habits, the patient must be warned against these. The system should also be braced up by good air, cheerful society, and the shower-bath, the latter being used only if it produce a genial glow of warmth.

There seems to be a consensus of opinion as to the benefit to be derived from the use of the bromide of potassium. Some prefer to give the drug alone, but others consider it better to combine it with bromide of ammonium or sodium (F. 69, 70*a*), or with bromide of ammonium, iodide of potassium, and tincture of calumba (F. 71*b*). The latter prescription is supported by the high authority of Brown-Séquard, who states "that the combination of bromides has far greater power than when either one is used alone." This treatment may be supplemented by counter-irritants, in the form of a blister at the spot where the AURA originates. If this is at the finger, then apply a circular blister in the form of a ligature to the finger itself. In carrying out the bromide treatment of epilepsy it is essential to act in no haphazard manner, but with an assured trust in its efficacy on the part of the practitioner, for this engenders corresponding and sympathetic hopefulness in the patient. Certain conditions are associated with its successful administration. The bromide of potassium, if taken alone, should be given to the extent of 45 to 80 grains daily; if in combination with 3-grain doses of the bromide of ammonium, a smaller proportion is requisite, as 30 grains of bromide of potass daily. The drug, according to Brown-Séquard, should be pushed to produce an evident, though not complete, anæsthesia of the fauces and upper parts of the larynx and pharynx. Sleepiness during

the day, occasioned by its use, may be avoided by giving a small dose before meals and a full dose at bedtime. The acne eruption of the face, neck, and shoulders should be produced, and if there should be no eruption within a few weeks of its administration, the dose should be increased, and also when the eruption is disappearing, unless there should be a decided daily sleepiness and signs of mental and bodily weakness. This production of the acne eruption has the sanction of Brown-Séquard; but it is to be observed that many English specialists do not consider it necessary. All, however, agree that the remedy should never be omitted to be taken until there has been fifteen to sixteen months' freedom from attacks of epilepsy. In cases where there is much debility, a nourishing diet with the use of liq. strychninæ hydrochloratis or liq. arsenicalis, preferably the former, should be recommended.

A gentle purge, as pulv. rhei co., every four weeks, gives a new impetus to the usefulness of the bromide treatment. Treatment by electricity, though commenced hopefully, has failed; so also setons introduced into the nape of the neck have not succeeded in producing any improvement. Of specific remedies we may mention those which have been chiefly advocated—viz. valerian, worm-seed (radix artemisiæ), atropine, hyoscyamus, inhalations of chloroform, ammonio-sulphate of copper, nitrate of silver, and oxide of zinc. The latter—the oxide of zinc—is certainly an efficacious remedy in epilepsy occurring before the twentieth year, given in $\frac{1}{2}$-grain dose three times a day, and increasing gradually up to 2 or 3 grains. If begun it should be continued for some months, as considerable time elapses before improvement is evinced. An old anti-epileptic powder consisted of valerian, belladonna, and oxide of zinc.

Dry cupping, the actual cautery applied so as to produce a white line, and anæsthetising the terminal nerve-fibres whence the aura originates, have been recommended as external remedies in addition to those already spoken of. If epilepsy is not *idiopathic*, remedies are of little avail.

Dietetics.—Stimulants, tea, and coffee must be entirely

forbidden to epileptics, or—in case this is for any reason impossible—should be allowed only in the very smallest quantities. Generally speaking, there should be abstinence from animal food, and life should be sustained by a vegetable and milk diet. No hard-and-fast line can, however, be laid down, and we must be guided in part by individual peculiarities and the observations made by patients on themselves. A sedentary indoor life is not to be recommended, but one which necessitates light work out of doors, as gardening. Light reading and the avoidance of emotional stories are essential adjuvants to treatment ; for it has by experience been proved that to forbid mental work entirely is seriously detrimental to the best interests of the epileptic.

Infantile Convulsions (Eclampsia Infantum).—The "teething convulsions" of children are by no means uncommon in the families of the poor, especially during the first dentition, and when the cutting of the teeth is difficult. "Convulsions from worms" are also well known. Intestinal disorders, as diarrhœa or undigested food, may act as exciting causes, especially if the child is rickety. Terror and mental excitement on the part of the nursing mother seem also to influence the child, and so to produce convulsions.

Symptoms.—The convulsions either commence suddenly, or there may be warnings. These warnings are diarrhœa, painfulness of the gums, symptoms of worms ; or they may be more immediately connected with the nervous system, as evidenced by disturbed sleep, crossness and fretfulness, rolling of the globe of the eye, or bending in of the fingers. During the convulsions the symptoms are similar to those of epileptic paroxysms. The child's eyes become staring and fixed, and there are spasms tonic and clonic of the face, trunk, and extremities. The child may die in one of these convulsions, or the seizures may continue for some days with short intermissions, or the child may, after the first attack is over, be perfectly free from them.

Treatment.—Lance the gums, administer an enema, and when the bowels have acted, BUT NOT TILL THEN, place the child in a bath at a temperature of 90° to 95° F., and when in the bath apply cool water to the head. If diarrhœa exists, an enema or bath is unnecessary, but an injection of chloral and bromide of potassium proves singularly valuable in a short time. If more rapid action seems desirable from the violence and frequency of the fits, a dessert-spoonful of chloroform should be poured on a handkerchief, and cautiously administered by inhalation.

VERTIGO.—*Variety*, Auditory; *Synonym*, Ménière's Disease.

By Ménière's disease is meant a group of phenomena, to which attention was first directed by Ménière in 1861, including sudden giddiness, staggering gait or tendency to fall on one side, vomiting, noises in the ear, and deafness on one or both sides—symptoms simulating intracranial disease. The deafness and noises in the ear usually remain permanent, while the other symptoms pass off for a time, generally to recur again, the deafness being more complete after each recurrence. On account of the giddiness and the tendency to fall to one side, Ménière believed that the cause of the phenomena in this disease was some morbid change in the semicircular canals. He based this explanation on the well-known experiments of Flourens, which pointed to that part of the inner ear as the organ which controls the equilibrium of the body. Ménière's disease is sometimes designated "labyrinthine vertigo," from the supposed seat of the symptoms. It has, however, been pointed out by aural surgeons, such as the famous von Tröltsch, that the phenomena of this disease may arise from morbid conditions in the external auditory canal and the middle ear, especially from any pathological condition which leads to abnormal pressure on the labyrinthine fluid, such as undue pressure of the stapes on the membrane which closes in the *fenestra ovalis*. It is very probable, however, that the phenomena of Ménière's disease are sometimes due to a sudden change

in the condition of the parts contained in the semicircular canals.

If the seat of the symptoms is not in the peripheral parts of the ear, the treatment is usually very unsatisfactory. Large doses of bromide of potassium have been recommended and should be tried. Gowers has used salicylate of sodium and gelsemium with good results.

Paralysis Agitans (Shaking Palsy).—This disease develops gradually, and attacks elderly persons of both sexes, being very rare before the thirty-fifth year. It is characterised by an insidious beginning, but when fully developed presents two marked symptoms—(1) Continuous tremor; (2) stiffness and shortening of certain muscles, consequent on which there is a series of peculiar movements.

The *tremor*, though continuous, abates in violence when the patient is quiet in mind and body, but the slightest excitement, even the knowledge of being watched, will throw the body into vehement and unrestrained action.

The *stiffness* is marked on the head and body, the head being bent on the chest and the body inclined forward, with the arms flexed at the elbow joint, the fingers doubled into the palm of the hand, and the legs flexed at the knees. If the patient is placed in a chair he cannot get up by himself, but a little assistance enables him to do this, and when he is lifted he will move on when "set a-going," until he comes up against some object, as a wall. The inability to stand still and the peculiar jog-trot style of forward movement are termed *festination*.

Etiology.—The cause of the disease is unknown. Most authorities think it is of a nervous character, others lean to the supposition that it is entirely muscular. Post-mortem examinations have revealed no definite lesion.

Diagnosis.—Paralysis agitans can only be mistaken for multiple sclerosis, but the character of the tremor varies in the two affections. It is continuous and oscillatory in paralysis agitans, while in multiple sclerosis it only occurs when an effort is made (intention tremor).

Moreover the general features of the diseases are dissimilar.

Treatment.—Some benefit has been derived from nervine tonics, especially arsenic, and on different grounds good effects have been stated to follow on the administration of a nervine sedative, as bromide of potassium. As a rule treatment consists in lukewarm baths and massage of the muscles.

"WRY NECK" or TORTICOLLIS.—There are two forms of disease known by the name of Torticollis—*fixed torticollis* or congenital wry neck and *spasmodic torticollis.* The former is not a disease of the nervous system; it arises from faulty development of the sterno-mastoid muscle, due to injuries during birth, and is observed first during childhood or early infancy.

SPASMODIC WRY NECK or TORTICOLLIS occurs chiefly at middle life in persons otherwise healthy, and is accompanied by jerking movements, sometimes limited to a single muscle, repeated at considerable intervals for a great length of time, and sometimes suddenly replaced by a similar movement of an entirely different part. At an early stage the intermissions are comparatively long, but later on they are of shorter and shorter duration until the spasms are almost continuous. The muscle most frequently affected is the sterno-mastoid, and next to that the upper part of the trapezius and the splenius capitis. The position of the head varies according to the muscles which are involved; but ultimately as the disease advances the recurring contractions turn the head away from the side which is the seat of the spasm, and it thus becomes permanently twisted.

Pathology.—The disease is not due to lesion of muscle or of nerve, but is a disturbance of the motor centres, either in the cortex of the brain or in the spinal axis, or perhaps in both situations in the same case.

The *prognosis* is very unfavourable; and in advanced cases the suffering is intense, and renders life a burden.

Treatment.—This is very unsatisfactory. Dr. Harley

has found benefit from succus conii in large and increasing doses, as from ℥i to ℥iv in a daily dose. Good sometimes results from bromide of potassium. A weak constant current passed continuously through the contracted muscles for five or ten minutes, causes relaxation for a time. But the benefit from its use is only temporary. Surgery in these cases does no good.

HYSTERIA

This term is misleading, being derived from ὑστέρα, the womb, thus indicating that the womb is primarily affected, and implying the exemption of the male sex from its influence. We know that these conditions are not absolute, for the womb is not necessarily in a morbid condition, and the male sex is subject, though only exceptionally, to hysteria. The term hysteria must, however, be retained, as it is identified with the literature of medicine, and it would be difficult to find any name which would exactly include the phenomena of the disease subsequently to be mentioned.

In hysteria there appears to be no definite alteration of structure in the nervous system, though this is simulated in many instances. It would appear that partial or complete suspension of the inhibitory influence is the main fact in the symptoms of hysteria, mental and physical. A laugh in a condition of health goes no farther than the will can control it, but in hysterical people a laugh may end in tears or shouts, or even in spasms and convulsions. It ripples into other nervous centres which are normally exempt from its exciting influence.

Hysterical paralysis indicates that the power of the higher centres in originating movement is in abeyance. Hysterical anæsthesia is due to lack of feeling or sensory impression, and hysterical hyperæsthesia and pain seem to be connected with the sensory ganglia which are morbidly excitable, and are not, as in ordinary states, dependent on the peripheral nerves.

Etiology.—The female is more prone to hysteria than the male, and there is some ground for believing that hereditary predisposition exists in many cases.

Hysteria usually occurs between fifteen and thirty—most frequently between fifteen and twenty. Often luxury, enforced chastity with prurient desires and thoughts engendered by light reading, unnatural desires, and unfortunate marriages, seem to evoke hysterical symptoms. Want of sleep from prolonged nursing of a sick relative is often a prominent factor. Hysterical symptoms seem to reach their acme, as in neuralgia and epilepsy, when the menstrual period approaches.

Symptoms.—The symptoms of hysteria may be grouped under (1) mental, (2) sensory, (3) motor, (4) circulatory, (5) visceral.

Mental.—There may be apparently increased mental power, but, if so, it lacks the firm control usually associated with higher cerebral development. The emotions predominating are often of an incongruous and ludicrous character. A pathetic story may evoke laughter; a ridiculous and amusing anecdote may cause tears. Common sense and prudence are absent, and an intense longing for the sympathy of others is a pronounced phenomenon. Unfortunately, there is often a mental twist which leads to deception and untruthfulness.

Sensory.—Hysterical pain and tenderness are seen in different situations of the body. They may simulate intercostal neuralgia, usually of the left side. They may appear to be due to a serious spinal disease affecting the cervical and upper dorsal region. They may settle in a joint, as the knee, and produce manifest and excruciating agony, resembling acute synovitis. They may reside in the mamma, and have the darting symptoms of cancer. They may attack the head, and excite suspicion of a cerebral tumour.

Epigastric and iliac tenderness are prominent phenomena in hysterical patients, while anæsthesia rarely affects the whole body, but usually is limited to one side, generally the left. This anæsthesia may be con-

fined to the surface, or it may be deep-seated, and pain is not experienced when pins are driven into the muscles.

The disorders of sensation in hysteria may, broadly speaking, be distinguished from organic disease by the fact that they are unstable, their appearance and departure depending on no fixed rule, and that they are apt to ensue on some worry or mental shock.

Motor.—Spasm, convulsion, and paralysis are the chief motor phenomena. The *globus hystericus* is perhaps the most constant sign of the disease. This feeling is described by hysterical patients as akin to choking, and is likened to an egg filling up the throat. It is often followed by a burst of tears.

Spasms affect various muscles connected with respiration. A cough, sharp and ringing, unaccompanied by expectoration, is seen to be developed when the patient is NOT alone, and when sympathy with her condition may be manifested. The expiratory spasm may be evinced by laughing and crying, or by yawning, hiccup, and sneezing.

Spasms, clonic and tonic, of limbs may occur, and may sometimes resist even the inhalation of chloroform. But faradisation, continued for some minutes, settles all doubts if applied to an hysterical contraction or a phantom tumour, for this exhausts muscular contractility, and, *nolens volens*, the ailment is cured.

Convulsive seizures are frequent, and simulate epileptic fits. It will be noticed, however, that the face in hysteria is more or less red, that the fall is always chosen so as to avoid positions of danger, and that the cry is not a "wailing shriek" like that of epilepsy, but a confused medley of choking, with much gesticulation. The tongue also is not bitten, and the deep sleep of epilepsy does not supervene on the attack, for the hysterical patient may in a few seconds recur to her former condition.

There is no incontinence of urine during a fit of a hysteroid character, though there may be a copious flow of clear urine at the termination of the seizure.

Paralysis may affect any limb, but paraplegia is the usual form. The muscles retain their nutrition, and in most of the cases there is no history of antecedent convulsions. The irritability to induced currents is also normal, although there may be at first an apparent slight loss.

Circulatory.—Syncope may develop and simulate death, for occasionally the pulse is imperceptible, the patient being speechless and apparently unconscious. Recovery, aided by the inhalation of ammonia, occurs, accompanied by profound sighing.

Visceral.—Vomiting is a frequent symptom, and may last for some months, without, however, any great loss of weight or sensible mal-nutrition. Noisy flatulence in the intestines is common, and retention of urine may be observed, or there may be an undue desire to empty the bladder regardless of appearances or proprieties.

Prognosis.—The prognosis, so far as life is concerned, is always favourable, but the disease, if maltreated by too much sympathy and attention, may last for a length of time. As a rule, with some few exceptions, the hysterical phenomena, of whatever type, cease with the end of the climacteric period.

Treatment.—The patient's surroundings must be carefully considered when the disease is fully diagnosed, and removal from home and a residence among strangers are always attended with benefit. Certain medicinal agents have undoubted value.

Thus, the inhalation of ammonia is a well-known and worthy remedy to avert an attack, and so also is a teaspoonful of ether. For continued treatment valerian in powder or tincture has a manifest effect, and the aloes and asafœtida pill (B. P.) has an established reputation. In hysteria with anæmia, iron is indicated, and the dialysed preparation is preferred as causing less disorder of the digestive powers.

Strong induced currents are useful in anæsthesia and paralysis, and there can be little doubt that hysterical convulsions are effectively mastered by douching the patient with cold water. For a few seconds the water

may seem to have no effect, but this condition is invariably succeeded by gasping, and the patient's movements or words indicate she does not desire to have the experiment continued. In many cases the remembrance of the treatment may prevent a repetition of the convulsions. The douche seems to act by the medium of the cutaneous nerves, and, by its action upon the ganglionic nerve-cells, to change the character of the blood-circulation.

Charcot recommends moral treatment in the form of isolation. Young persons, whether male or female, should be separated from their parents, and placed under the care of experienced and firm nurses, and only at occasional intervals (when amendment is progressing) should they be allowed to see friends for a short time as a reward for good conduct. This isolation is supplemented by the Weir Mitchell treatment; see p. 531.

Catalepsy (κατάληψις, a seizure).—Much speculation and little definite knowledge have been the result of observation and reasoning on cases of catalepsy, and all that can be safely said is that it seems to be a neurosis midway between epilepsy and hysteria. Indeed some regard it only as a peculiar type of a hysterical paroxysm. It may occur at any age in either sex, but it is much more common in females than males at the age of puberty.

Symptoms.—Preceded, it may be, by headache and giddiness, or simply by a feeling of nervous exhaustion, the cataleptic seizure deprives the patient of consciousness, and she remains fixed in whatever position she occupied at the commencement of the fit. The eyelids may remain open or shut, and the pupils may contract under the influence of light. The great peculiarity of a cataleptic seizure is that during its continuance, which may be minutes or hours, the muscles become plastic and waxlike, and the limbs retain any position in which they are placed. Thus, if sitting, the arms may be put at any angle to the trunk, or if in bed the spine may be bent upon the pelvis so as to form an obtuse angle with the thighs. Hence the name *flexibilitas cerea.*

The *prognosis* is favourable.

Treatment.—Attempts may be made by external stimulation to rouse consciousness, and for this purpose ammonia may be applied to the nostrils and sinapisms to the limbs. These stimulants generally fail, but often a pinch of snuff may restore sensibility; if it does not, faradisation may be tried, which usually succeeds. In very obstinate cases apomorphine in $\frac{1}{12}$ of a grain dose may be injected, and the vomiting induced may terminate the attack. During the intervals, iron, antispasmodics, and cold baths should be trusted to, and the patient should be removed from all local influences which seem to favour the attack. Hence a change of air and scene is an almost absolute necessity.

CONGENITAL MYOTONIA (Thomsen's Disease).—Thomsen, a Sleswig physician, in 1876 described this disease, which he called "tonic convulsions of the voluntary muscles." Now the name more appropriately given to it is "congenital myotonia." The disease appears to be congenital and hereditary, and males suffer more than females. The essential symptoms are:—Whenever a voluntary muscle has been inactive for a time, and is then made to contract, it falls into a state of more or less persistent contraction, which cannot be immediately relaxed. Mental excitement seems to exert an unfavourable influence, and quick and accurate movements are beyond the control of the will. The disease is permanent, and there is little constitutional disturbance.

The explanation of the symptoms given is difficult, but a physical examination reveals great development of the muscles, so that it deserves the appellation of "genuine muscular hypertrophy." From this fact it is probable that the cause of the disease lies in the muscle itself, and this idea is supported by the microscopic examination of minute particles of muscular tissue, which showed "marked hypertrophy of individual muscular fibres and an increase in the number of nuclei of the sarcolemma" (Erb).

Spinal Irritation.—Much controversy has existed as to the exact position of this affection in medical nosology. By some it is mentioned simply as a symptom of hysteria, and by others it is considered as a disease having a spinal origin. We do not think that spinal irritation can in all cases be explained by a hysterical condition, and therefore we think it advisable to retain the term as indicating a neurosis. The affection has considerable importance, for patients suffering from it are often seen in general practice.

Etiology.—We must admit that we cannot state on what part of the nervous system the disease depends, *i.e.* whether on alterations in the nervous system as a whole, or on disturbances of the circulation, or on vaso-motor influences. Generally we may say it is associated with a weak state of the body, and is an evidence of debility rather than strength. It is seen more often in females than males, at ages from fifteen to twenty-five.

Symptoms.—There is a history of gradual weakness, specially situated in the back and loins, accompanied with a wearied feeling after walking some distance, or when the erect position has been for any length of time maintained. A physical examination sometimes fails to reveal any marked seats of pain. Yet as a rule, if pressure is made on the spinous processes, it will be found that in some situations more than others considerable pain is produced. There are two distinct areas of tenderness, from the seventh cervical to the third dorsal, and the eighth dorsal to the second lumbar. This tender spine may be said to be a spine of congestion and exhaustion, and from it many forms of perverted sensibility arise. Thus there may be positive pain clearly traced from the spine along the course of the nerve. Thus may temporary changes in the joints occur, with swelling and immobility. Thus also there may be dyspnœa, palpitation, irregular pulse, sleeplessness, flatulence, constipation, or diarrhœa. Thus also the natural temperament becomes perverted, and the patient is irritable, melancholy, or moody.

Treatment.—The Weir Mitchell treatment of this

affection consists in the combination of the several factors that constitute it, namely, (1) rest; (2) isolation; (3) systematic feeding; (4) massage; (5) electricity. For six or eight weeks the patient is confined to bed, isolated from sympathetic friends, and placed under the charge of an experienced nurse, who is bright and cheerful, and possesses tact and firmness. During the first week the diet should consist of skimmed milk, slightly warmed, the quantity taken daily being two quarts, and divided so that two or three ounces are drunk every two hours. Afterwards more nutritious diet is given, as gruel, chicken soup, or light puddings.

Massage more than supplies the want of exercise, tissue-metamorphosis becomes rapid, and waste products are more effectually eliminated.

The electrical treatment consists in the use of the constant current.

The return to the ordinary ways of life must be very gradual, and in many cases a sea voyage does much to confirm the cure.

Spinal Nervous Weakness (Neurasthenia Spinalis). —Neurasthenia, weakness of the nerves, is capable of assuming various forms. In some cases the entire nervous system is more or less affected, in others the brain, and in others still the functions of the cord. On the latter spinal form we desire to make a few remarks. It may be defined as a functional disorder, for we can find no considerable anatomical basis on which it depends.

Etiology.—A predisposition to this affection is most common to males, in youth or middle age, who belong to the upper classes, and whose family history is neuropathic. Direct causes may increase this predisposition, and of these direct causes three are particularly active—(1) excessive mental efforts; (2) sexual excesses; (3) great bodily fatigue, as from long forced marches or mountain climbing. The injury is most distinct when several of these causes coexist, *e.g.* great mental and bodily over-

work, with disturbance of nightly rest; or when amid great mental overwork sexual excesses are indulged in.

Symptoms.—1. Motor disturbances, principally consisting of a striking weakness and rapid fatigue of the lower extremities.

2. Variety of disturbances of the sensory area, *e.g.* a peculiar pain in the back, evidenced when the spinal column is bent forward or backward; slight shooting or tearing pains in the district of certain nerves in the extremities; slight numbness in connection with cold feet. Disturbances of sexual functions are manifested—"Post coitum animal triste est"—and in neurasthenia this is exaggerated so that there is remarkable prostration, with half slumber and profuse perspiration. The functions of the bladder are normal. The objective symptoms are negative. There is no trace of disturbance of motion; the patient stands on one foot, and can walk perfectly with closed eyes, only the power of endurance in muscular action is weakened. There is no disturbance of sensibility, no sensitiveness over the spinous processes, no atrophy, no change of electrical reaction, no weakening of reflex action. The only distinct symptom is a wearied, suffering, anxious expression.

Treatment.—Gain the confidence of the patient, and when this is done forbid the excessive claims on the nervous system, and interpose a period of absolute rest from hurtful occupation or pernicious habits. Of plans of treatment for the direct relief of the disease, well-regulated hydropathy takes a foremost place, as sitz baths, tepid at first and gradually made colder; rubbing the back with partly-warmed water, and avoiding the douche and very cold applications. Mountain air and exercise, without fatigue, are also beneficial; so also is the electric current, not too strong, in the ascending direction, with change of position of the electrodes. Of drugs, the preparations of strychnine or nux vomica in small doses, or of iron and quinine, give the most satisfactory results.

Writer's Cramp (*Synonym*, Scrivener's Palsy) is a

form of nervous disorder attacking those who have a great deal of writing as their daily occupation, such as lawyers' clerks, secretaries, etc. I have also seen it twice in medical students who took notes of lectures in a too diligent manner. It is at first attended with fatigue and inability to hold the pen properly, and ultimately, if it progresses, with spasmodic irregular movements of the forefinger and thumb when any attempt is made to write.

Treatment.—Half-measures are of little avail, for complete abstinence from writing is essential to restore nervous energy. If this be done, systematic massage aids recovery.

DISORDERS OF SLEEP

The amount of sleep varies at different ages, as the following table shows :—

Up to 10 years, children usually sleep for 14 or at least 12 hours.
From 10 to 15 the duration of sleep varies from 10 to 12 hours.
,, 15 to 25 it should not be below 8 hours.
,, 25 to 50 it may fall to 7 ,,
After 50 the sleep varies from 7 to 6 ,,

Sleep may be either excessive or defective, and wakefulness, if prolonged, may end in a grave condition—insomnia. This condition is associated frequently with great grief, mental anxiety, overwork, or it may be the result of excessive pain or the abuse of alcohol.

Byron stated that healthy sleep consisted in being lulled by the waves of the ocean, and awakened by the songs of birds. This Utopia cannot be attained, for in this busy age, with much bustle and worry, sleeplessness is often a marked symptom, either in males or females, at the ages of forty to fifty. In the former it may lead to insomnia, in the latter to a restless, fidgety state, which prevents all natural repose.

Treatment.—The treatment of sleeplessness requires firmness and tact. It is essential that the digestion should be in perfect working order—food being taken at regular hours, with the action of the bowels solicited at a time fixed every morning, before or after breakfast. On rising, the feet should be placed in warm water, and the body thoroughly sponged with cold water. If the reaction is healthy, a shower-bath should be taken. Exercise is of paramount importance; in the case of a man, it should average ten miles a day, in a female, at least six miles. On going to bed, the feet should be bathed in cold water and dried thoroughly with a rough towel, until they are warm and red. If the feet be cold sleep is impossible. The head should rest on raised pillows, and immediately before or after entering the bed some beef-tea, gruel, or a little whisky in hot water may be taken. A walk of one or two miles, preferably against a wind or up a hill, before retiring, is, in the case of males, often attended with excellent results. When in bed, by the light of a candle, some not too interesting book may be read until the letters and sentences become confusing, when the candle should be blown out, and sleep wooed. A non-professional friend informs me that for forty years he has systematised the best conditions for sleeping, and these are, in his own words :—

He closes his eyes and breathes very slowly, leaving as long an interval as he can before each inspiration. To keep out every idea that might lead to a train of thought, he mentally counts these acts of breathing up to twenty, and then begins again at one, two, etc., till asleep. Sleep comes on in from one minute to five minutes. At the last moment, he sometimes makes a *very* slight change of position, and this is almost always his last conscious act.

The attention to the breathing and the necessity for a slight monotonous effort in counting, produce physiological conditions which favour sleep.

When such measures fail to produce the desired effect, the question of hypnotics must be considered. Of these the bromide of potassium in a dose of 30 grains in

half an ounce of water can be recommended, and its influence is heightened by the addition of 10 grains of hydrate of chloral. Alone the hydrate of chloral is a dangerous remedy and an insidious friend to the sleepless. If taken the dose should at no time exceed 30 grains, and the patient should be warned that its continued use saps the physical and mental tone. Of newer hypnotics, we may say that paraldehyde is safe and valuable, but its persistently nauseous taste restricts its use to hospitals or asylums. Sulphonal requires some hours to elapse after it has been taken before any effect is produced; and on awakening the patient's speech is thick and stammering and the gait uncertain. Undoubtedly the best of the new hypnotics is chloralamide. During the last two years it has steadily grown in professional favour, and it is recognised as possessing all the advantages with none of the drawbacks of hydrate of chloral. Its action is increased by combination with the bromide of potassium, and a solution containing equal quantities of these drugs can now be obtained under the name of *chlorobrom*. This preparation is palatable, potent, and safe.

MENTAL DISEASES

GENERAL PARALYSIS

Synonym, General Paresis.

In the course of some forms of mental derangement, a gradually advancing paralysis sooner or later involves nearly every muscle of the body, and hence it is called "general paralysis," or familiarly, "G. P."

Those attacked are most frequently males between thirty and fifty years of age. The causes are obscure. Some assert the disease is due to mental overwork and anxiety, to venereal or alcoholic excesses, or to a sudden and unexpected strain on the mental organisation. Grave warnings sometimes precede the affection, or the disease

may come suddenly on persons who seemed previously to have enjoyed robust health.

Anatomical Characters.—The pathological changes are differently rendered, the precise nature not yet being definitely settled. The lesions chiefly observed are congestion and thickening of the membranes of the brain, with a fatty or shrunken condition of the nerve-cells and an increase of the connective tissue.

Symptoms.—The symptoms are divided into mental and physical.

1. Mental.—Mental symptoms generally precede the physical. The first indications are sleeplessness and restlessness, and an inability to speak, write, read, sing, or fix the attention on any particular subject. This enfeeblement of the mental powers gradually advances, until absolute fatuity results. Before the latter stage is reached there are generally extravagant ideas observed by friends, such as the fancied possession of great wealth, infinite power, or colossal size. Wild schemes are seriously entertained, and hopefulness in a fair and brilliant future, notwithstanding dubious surroundings, is daily intensified.

2. Physical.—The physical symptoms are, great fatigue after slight exercise and utter prostration after any unusual exertion. There is a convulsive tremor of the upper lip after any excitement, and a trembling in the tongue when an attempt is made to hold it out. This paralysis of the lips and tongue leads to defective blurred articulation, and the face loses all expression, and assumes a sad or blank look. Tremor of the feet is noted in performing simple actions, such as getting out of cabs or walking down stairs. These symptoms are succeeded by a general and progressive loss of co-ordination. As the disease advances to its almost invariably fatal termination, the physical strength diminishes, and the patient, unable to walk, stand, or sit, is confined to bed for the rest of his existence, death occurring either from the difficult deglutition leading to choking, or from sheer exhaustion or some intercurrent affection. Atrophy of

the optic nerve can often be detected by the ophthalmoscope, and it is noticed sometimes at an early stage that there is an unequal contraction of the pupils, and occasionally a fixed squint.

Prognosis.—The ordinary duration of the disease is from a few months to three years. Complete recovery seldom occurs.

Treatment.—If the disease is detected in its very early stage, the patient should avoid all irritation, abandon if possible his usual business, be much in the open air, and take regular walking exercise every day. Sexual intercourse should be avoided. Light novel-reading should be enjoined, and amusement, such as playing at whist, recommended in moderation. Occasionally, by strict observance of the injunctions mentioned, aided by the kindness of friends, the dreaded malady may be averted. When, however, this is not the case, and the malady steadily advances, all that can be done may be accomplished by careful nursing at home, and, if possible, without removal to any asylum.

The other mental diseases are:—Hypochondriasis; Mania; Melancholia; Dementia, including Acquired Imbecility; Idiocy (*Synonym*, Congenital Imbecility); Puerperal Insanity; Epileptic Insanity; Insanity of Puberty; Climacteric Insanity; Senile Insanity; Toxic Insanity, from alcohol, gout, lead, etc.; Traumatic Insanity; Insanity connected with obvious morbid change in the brain; Consecutive Insanity, from fevers, visceral inflammations, etc.

The consideration of these various forms of mental diseases is embraced in special works bearing on the subject, and is foreign to the nature of this handbook.

DISEASES OF THE SKIN

The student of dermatology is, at the outset of his studies, embarrassed and bewildered by the unwieldy terminology usually attached to the subject. If the classifications and nomenclatures were constant, little or no difficulty would be experienced, but individual dermatologists commonly coin new names and classifications, so that at present there is no department in medicine in which diseases have so many synonyms. To avoid thus confusing the student we have described the various skin affections under their more common appellations.

Nor is any classification wholly satisfactory. The imperfect knowledge of cutaneous pathology renders a strictly pathological classification not free from objection, while that adopted by Willan and Bateman, although convenient and easy, is arbitrary and unscientific.

We have in this edition followed a pathological arrangement which for clinical purposes we believe will be more useful, although the classification which follows is not based on the elementary lesion; yet the student should have an idea of the nature and appearance of the more common lesions of the skin.

Thus *pomphi*, or wheals, are rounded elevations of the true skin, attended by active congestion and effusion of serum into the meshes of the skin; they are pale in the centre, appear and disappear with great rapidity, and are attended by an extreme degree of tingling and itching. Their occurrence seems intimately dependent on changes in the nervous system. They are seen principally in *urticaria*, or nettle-rash.

Excoriations are simply abrasions, and exhibit merely a ruffling or actual detachment of the epidermis. They often result from scratching.

Ulcers differ from excoriations in the fact that they involve the true skin, and when they heal they leave a cicatrix.

Rimæ, or fissures, are well seen in the cracks found on chapped hands.

Crusts consist to some extent of epidermic scales, but most largely of dust and desiccated blood, serum, or pus.

A *cicatrix* is the mark left by the healing of a wound or ulcer. In some forms of lupus cicatrisation goes on subcutaneously, the morbid tissue being replaced by cicatricial tissue without breach of surface.

Many skin affections are very intractable, and often at best only yield to treatment after a lengthened period; while others, again, are practically incurable, as elephantiasis and epithelioma. But if the true nature, the causes and conditions, be rightly apprehended, and the requisite means adopted, a favourable issue in most instances will ensue.

The student should beware of making a DIAGNOSIS from an imperfect or partial examination of the patient, as the appearance of many skin affections rapidly changes. The whole cutaneous surface, whenever possible, should be examined.

Treatment.—The treatment of skin diseases is constitutional and local. Thus, constitutional treatment is sufficient in all the forms of syphilis except the ulcerative; local treatment is chiefly required in psoriasis (non-syphilitic). Usually, however, a combination of constitutional and local treatment is necessary, the former to combat the cause of the eruption, the latter to soothe the local irritation. Inflammatory affections must be treated by mild tonic aperients, followed, when the inflammation has subsided, by special tonics, as iron, arsenic, and quinine. For the non-inflammatory group arsenic is the special remedy.

Local Treatment.—Oxide of zinc ointment alone or with lanoline forms the basis of soothing ointments. Chronic eczema requires stimulating applications, as spirit of tar or oil of cade, while lupus is attacked by caustics.

CLASSIFICATION OF SKIN DISEASES

I. Inflammatory Affections.

(*a*) *Superficial Inflammations*—

Eczema (acute and chronic)
Erythema
Urticaria
Impetigo
Roseola
Lupus Erythematodes.

(*b*) *Deep-spreading Acute Inflammations*—

Erysipelas
Boils
Carbuncles
Ecthyma.

II. Anomalies of the Epidermis.

Psoriasis
Lichen (Simplex, Circinatus, and Planus)
Pityriasis Rubra
Pemphigus
Rupia
Cheiro-pompholyx
Ichthyosis.

III. New Formations (Chronic Infectious Diseases of the Skin).

Lupus (L. Vulgaris and L. Erythematodes)
Leprosy
Syphilis
Glanders
Yaws
Elephantiasis.

IV. Neuroses of the Skin.

Pruritus Prurigo Herpes.

V. Anomalies of Growth and Colour of Hair.

Alopecia, etc.

VI. Anomalies of Pigmentation (Chromatopathic Affections).

VII. Anomalies of Secretion.

(*a*) *Sebaceous Glands*—

1. Hypersecretion.

Acne Acne Rosacea Sycosis (Eczema Pilare Faciei).

2. Decreased Secretions.

Xerosis.

(*b*) *Sweat Glands.*

1. Quantitative changes of sweat.

Hyperidrosis Anidrosis.

2. Qualitative changes of sweat.

Coloured Sweats (Cyanidrosis).

VIII. Parasitic Affections.

(*a*) *Animal Parasites*—

Scabies: Phthiriasis (Pediculi Capitis, Corporis, Pubis).

(*b*) *Vegetable Parasites*—

Favus (Tinea Favosa); Ringworm (Tinea Trichophytina) of head (T. Tonsurans); body (T. Circinata); and beard (T. Sycosis).
Pityriasis Versicolor.

IX. Medicinal Rashes.

I. Inflammatory Affections.

(*a*) *Superficial Inflammations*—

1. Eczema—Catarrh of the Skin—is by far the most common and most important of diseases of the skin. It affects equally both sexes, and although no period of life is exempt from it, it is most frequently seen in childhood, when the skin is peculiarly soft and delicate. The symptoms presented in every case are characterised by hyperæmia, exudation, œdema, and in a later stage by the formation of crusts, scales, or infiltrations on a reddened, moist, or dry surface. Every form of the disease is accompanied by more or less severe itching. The succession of symptoms here mentioned may be more clearly traced in the form of eczema termed *acute*. Eczema may follow either an *acute* or *chronic* course. Eczema may be regarded as chronic when it relapses, or occurs frequently in the same sites, or when certain secondary processes have set in, as conditions of swelling and hardening or atrophy of the glands and adipose tissue.

A great many varieties of eczema have been distinguished by different dermatologists, of which the following are the principal:—E. Erythematosum, Papulosum, Vesiculosum, Rubrum, Squamosum, Rimosum.

Acute Eczema (E. Simplex) may occur on any part of the cutaneous surface, but it is chiefly seen on the face, genitals, hands and feet. The eruption is ushered in by redness, swelling, and vesiculation, with sensation of tingling and tension. These local symptoms are accompanied by general uneasiness, gastric derangement, sleeplessness, and other febrile symptoms. The disease may be limited to the immediate neighbourhood of its primary situation, or it may extend extensively over the cutaneous envelope. Often the entire skin becomes very tender, and in such cases the slightest irritation will tend to develop the local symptoms on parts previously unattacked. In favourable cases the vesicles or pustules dry up and disappear with intense itching and the formation

of crusts or scales, or the phenomena supervene of inflammatory eczema, which is characterised by a reddened and moist surface, a free discharge, at first of serum or pus, from the ruptured vesicles or pustules, which dries up into yellow, green, or brown crusts. The whole process occupies about a week or ten days, but the eruptions may return at the same or different places, and the disease may gradually become chronic.

Chronic Eczema presents the same local changes as the acute form, but from repeated attacks of inflammation, œdema and infiltration of the skin, with more or less profuse exudation and crusting, are added. The amount and consistence of the secretion from chronic eczema varies very greatly in the different varieties of the disease. In some cases (*dry eczema*) it may be entirely absent. At night or when warm in bed the itching is very distressing, and the irresistible inclination to scratch causes excoriation and increased exudation, which, although it relieves the itching, is replaced by a burning sensation. Chronic eczema, being often a sequence of the acute form, is found in the *same* situations as the acute variety, and also on *special* situations presenting special peculiarities. Thus, for example, it occurs in the form of *fissures* at various orifices as the mouth and anus, and also on the nipples of nursing mothers. On the palms of the hands, where the epidermis is naturally thick, the disease is characterised by the presence of deep fissures running between greatly thickened sections of epidermic tissue (*E. Rimosum*).

Etiology.—An inherited delicacy of skin causes a predisposition to eczema, and in such cases slight external irritation may suffice to evoke an attack. But in addition to this there is evidently, in some individuals, a strong hereditary or constitutional predisposition to the disease. Certain diseases are important factors in the production of eczema, as dyspepsia, gout, albuminuria, nervous debility, uterine affections, pregnancy, lactation, and the tubercular diathesis.

Among the exciting causes the chief are the action of water alone, or when in the form of sulphur and saline baths, or from perspiration due to its alkaline character; or from the direct action of the sun in hot weather, or from the blisters which occur in those who perspire freely. In addition may be mentioned the action of numerous drugs, as irritating plasters, mercurial ointments, strong alkalies, rancid oils, and irritating powders; as well as the irritation set up by the presence of the "acarus scabiei" or the "pediculus capitis."

Treatment.—To treat eczema successfully it must be determined whether the affection is acute or chronic, and the exact predisposing and exciting cause must be carefully estimated and if possible removed. There should be no empirical treatment of this or of any other skin affection. Each case should be treated on its own merits.

If acute sometimes the best treatment is to let it alone, allowing the patient to be in bed lightly covered, and abstaining from the outward use of water. Still, local treatment is often necessary and useful to relieve burning and itching, and the most suitable applications then vary with the sites of the disease. If two cutaneous surfaces come in contact, as in *eczema intertrigo*, cotton pads, which have been dipped in a powder containing 1 per cent of finely pulverised boracic and 1 per cent of salicylic acid, should be placed between these.

Pure starch flour is serviceable for moist surfaces and for the early stages of the papular and vesicular form. When the exudation is profuse Hebra's diachylon ointment should first be used, and when the exudation is somewhat diminished the surface should be dusted, according to Unna, with a mull drawn through the melted lead ointment, and subsequently dried. When desquamation occurs vaseline or zinc ointment proves useful.

If the diagnosis be chronic eczema, then the leading indications of local treatment are :—

I. The removal of the crusts.

II. The healing of the moist surface.

III. The removal of the hyperæmia and desquamation with coincident "itching."

1. The crusts should be removed by warm linseed poultices, or by compresses of soft or distilled water frequently changed. When the disease occurs on hairy parts oils and fats are preferable to water applications. They should be rubbed in with a painter's stiff brush, and the part should be afterwards covered with a woollen rag, which has been dipped in the oil. As a rule, the crusts or scales come off when the dressings are removed. The hard scales on the hands or feet yield best to salicylic acid applications, as Unna's salicylated gutta-percha mull, which should be applied for 6 or 8 days. When the mull is removed the hardened epidermis comes away, and then salicylic ointment should be rubbed in at an interval of an hour. Salicylic acid plaster (Beiersdorf's) is an elegant and effective application for removing horny epidermis. In certain cases it is necessary to apply soft soap when the epidermis is much thickened, and when a lather has been formed to wash it off with warm water. Or a plaster of salicylic acid containing soap may be applied at once.

2. The second indication is to heal the moist surface, and for this purpose diachylon ointment is usually employed, and when this appears to be too irritating the milder zinc ointment should be used. If fatty substances be not tolerated the affected surfaces may be bathed with liq. plumbi subacetatis. By some of these methods the moist surface is dried by the slight astringent action of the applications. Linimentum calcis is soothing and astringent, and forms an excellent adjunct to one or other of the above ointments.

3. To remove the hyperæmia and desquamation which now follow, preparations containing tar are invaluable, as unguent. pic. liquid. or spirit of tar (pic. liquid. 1; spirit 1). The tar ointment is rubbed into the part, and the spirit of tar is laid on in thin layers with a brush. The ointment is contraindicated, and the spirit is indicated, in eczema of hairy parts and in eczema of the hand.

In some cases, and especially on circumscribed spots, tar, either in the form of the ointment or the spirit, softens the epidermis, and then naphthol, or preferably chrysarobin, ointment should be applied with a brush.

Constitutional treatment of eczema must not be neglected. Arsenic must be avoided when the disease is acute, but salines, with a careful regulation of the diet, are necessary. A Seidlitz powder may be administered in the early morning occasionally in the case of an adult; and when a young child is the subject of the disease, a mild alterative of gray powder and rhubarb will be found valuable. The diet in all cases should be light and non-stimulating.

Impetigo.—The term Impetigo is still used to designate the cutaneous diseases impetigo contagiosa and impetigo herpetiforme.

Impetigo Contagiosa, as it often attacks children in the same family, is said to be contagious. Vesicles, from the size of a pin to that of a lentil, appear most frequently on the face, forehead, and back of the hands. The bases are not usually inflamed, and they very soon dry up into a crust which *seems to be glued on.* These, on falling off, leave a smooth surface free from scales. There is no pain or itching, and the disease usually disappears spontaneously in from two to six weeks. The cure is hastened by zinc or white precipitate ointment.

Impetigo Herpetiforme is rare; only nine cases have been recorded, and these occurred in pregnant women, commencing in the final months. The outline of symptoms is an eruption of pustules arranged in groups, filled with a yellow purulent liquid, and drying into yellow flat scales under which a red contracted surface is perceptible, and which is surrounded by a succession of new clusters and rings of pustules. The pustules are always largest and most numerous on the anterior surface of the body and the inside of the thigh. Each crop of

pustules is preceded by rigors, and the patients in fatal cases usually succumb to exhaustion.

The cause of the disease is still obscure.

Treatment.—This is antiphlogistic and alterative.

ERYTHEMA SIMPLEX

The term Erythema is applied to inflammation of the skin, consisting of superficial and usually dusky red patches varying in size and depth of colour, disappearing under pressure and terminating in resolution and desquamation. One of the most important points in the clinical diagnosis of this affection is the *absence of itch.*

There are three chief varieties of erythema:—1. *Erythema Simplex* is generally acute in its course, and it may be accompanied by little or by very considerable constitutional disturbance. It has a sub-variety, "erythema fugax," so called from its shifting character, and its appearing and disappearing at intervals on different parts of the body. Sometimes it is observed in fevers on the face, trunk, and upper extremities, and its appearance on such occasions forms an element in determining an unfavourable prognosis. 2. *Erythema Papulatum* is often seen in young persons at the age of puberty, and is usually associated with some disorder of the menstrual or digestive functions. Small papules may appear on any part of the body, but, as a rule, the sites selected are the back of the hands, neck, or face. These papules spread and coalesce with one another until the parts affected are covered with a red blush, which lasts for a few days and then disappears, with some itching. 3. *Erythema Nodosum* has a nodular appearance, the knots or patches being about one or two inches in diameter, attacking the surface of the legs between the knee and the ankle. It is always attended by much gastric and general disturbance, and often by articular pains and swellings, resembling exactly those of rheumatism. It is more common among females than among males, and occurs generally between

the ages of 15 and 30. There are also sub-varieties, Erythema leve and Erythema iris.

Treatment.—Mild saline aperients are serviceable for simple erythema (F. 24). Rest in bed and tonics, more especially quinine or cinchona, are recommended for erythema nodosum; if the articular symptoms be prominent, the salicylates will prove useful. Greasy applications aggravate all the varieties of the disease, but soothing dusting powders (F. 55) give relief. Cloths soaked in whisky and water are also useful in the simple and papular forms; while the spread of the migratory variety may usually be checked by the application of a strong solution of nitrate of silver.

Roseola.—After extreme heat or fatigue, slight fever sets in with tingling and soreness of the portions of the body affected. On these red circular spots appear as large as shillings, with a white spot in the centre. The original circular spots develop into rings varying in configuration and size, which are sometimes distinct and sometimes blended together. The fourth day may be represented as the height of the eruption, after which it gradually disappears.

Diagnosis.—The eruption of roseola may be difficult to distinguish from that of measles. The main points to consider are the history of the case and the character of the eruption. Roseola is not preceded by the running at the eyes or nose seen in measles, and it has no definite site where the eruption may first be observed, for it may appear on the neck, trunk, limbs, or face.

Treatment.—Alteratives, laxatives, and tonics, according to the state of the system at the time the roseolar eruption appears (F. 8).

Urticaria (Nettle-Rash) is a peculiar skin eruption characterised by efflorescences (wheals) varying in size from a bean to a thumb-nail, firm to the touch, pale-red or whitish in colour, and elevated above the level of the skin. It usually appears suddenly, has a brief duration

or changes into a chronic character, causing violent itching, and progressing to recovery without desquamation. It appears, as a rule, without prodromata; but at times there are depression, malaise, nausea, fever, and headache, which last from a few hours to one or two days. The wheals may be scattered over the body without being confluent, or they may be close together or nodose resembling erythema.

Etiology.—The causes, direct or indirect, in every case are such as exert a special effect on the vaso-motor system, partly as a whole or partly on some portion of it. Every morbid factor followed by nettle-rash excites the termini of the sensory nerves, extending into the external skin or in the mucous membrane. They excite the vaso-motor nerves, reflexly cause the capillaries to contract, and by the surrounding paresis incite the transudation in a circumscribed region. So the wheal is produced, which accordingly represents nothing else but a localised œdema.

The direct causes affect the peripheral distribution of the cutaneous nerves and may take the form of direct pressure on delicate skins, or of cold, or of the action of the electric current, or of touching the skin with the common nettle, or of stings of insects, as mosquitoes, fleas, or bugs.

The indirect causes are a febrile condition, the taking of some kinds of food, as oysters, crabs, lobsters, salted sea fish, mussels, pungent spices, strawberries or other fruits. Taking drugs, as copaiba, tolu, or turpentine, may, in certain individuals, always produce urticaria, and so also may fright, grief or anger, derangement of menstruation, or affections of the digestion and respiratory system.

Treatment.—In the acute form, if due to gastric causes, an emetic is not necessary, but a laxative, as pulv. rhei co. If it be due to a particular kind of food it is well to guard against relapses by forbidding this food being taken again. For the itching, either in the acute or chronic form, an excellent remedy is cold water, to which may be added vinegar or spirit of wine. Lotions may also be employed as ℞ acid. carbol. gr. xxx., glycerini ʒss,

spt. rectificati ad ℥vj. Ointments are, however, preferable to lotions because of their longer contact with the skin, as ℞ sulph. sublim. ʒi, ol. cadini ʒii, unguent. zinci ℥i. This should be rubbed in twice daily, and the patches afterwards dusted with starch. The methods mentioned generally succeed, but in cases which are especially chronic and troublesome, internal remedies should be given, as hydrobromate of quinine in 5-gr. doses every four hours. A still more effective measure is atropine, as ℞ liq. sulph. atrop. ♏ii. Ext. gentian. gr. xx., gum acacia q.s. Make xii. pills. One every four hours. In urticaria arising in young children during dentition an alterative of gray powder is very helpful. The coincident irritability of the skin may often be relieved by suitable doses of antipyrin.

Lupus Erythematodes or Lupus Erythematosus.—This disease has been considered a tubercular one. Recent investigation with Koch's tuberculin would seem to throw considerable doubt on this, as in several well-marked cases no reaction followed the injections. It may, perhaps, therefore, be inferred that lupus erythematodes is a simple inflammatory affection.

This disease commences as a slightly raised, shining, violet red patch, usually on the prominence of one or both cheeks. Starting as a small round patch, it spreads very slowly at the circumference, while the central portion heals, becoming white and hard, and leaving a permanent cicatricial appearance. From the first to the last no ulceration is observed, and cicatrisation is due to interstitial absorption.

Lupus Erythematodes occurs more commonly in females than in males, and it is rare under the age of 20.

Treatment.—Constitutional and tonic remedies must be employed. Local applications of the nature of mild caustics are beneficial. The application with a brush of fluid carbolic acid is highly recommended. As a rule, strong nitric acid is unsuitable, but the iodide of sulphur ointment may be employed with benefit.

(*b*) *Deep-spreading Acute Inflammations*—

ERYSIPELAS.—This disease has already been described; see p. 91.

FURUNCULI (Boils).—In most instances, although this cannot always be demonstrated, boils are associated with inflammation in a hair sac. The feature of true furunculus is the inflammation leading to the death of a minute portion of the deep layer of the cutis. The plug of dead tissue is expelled by the process of suppuration, and a slow-healing abscess is so formed.

A boil starts as a small painful pimple, which by and by at its summit presents a yellow spot due to the formation of pus. It then becomes intensely red and œdematous, and the pain correspondingly increases and becomes throbbing in character. When the abscess has ripened the slough is discharged, and the signs of inflammation rapidly disappear.

Boils are seldom solitary, and are apt to occur in crops, and to occasion considerable constitutional disturbance. The nape of the neck, the buttocks and back, are most frequently attacked. As in some cases the presence of boils seems to be associated with diabetes, the urine should always be examined.

Treatment.—Both local and constitutional treatment is necessary as a rule. Warm linseed poultices, or water dressings of Goulard's solution, serve to relieve the pain and soften the epidermis. The application of a minute quantity of lin. iodi, on a spicule of wood to the summit of the boil when in the papular stage, is often successful in arresting its development. Saline cathartics should only be given if there is coincident constipation; but iron, arsenic, and cod-liver oil are useful remedies when the disease occurs in debilitated subjects.

CARBUNCLE is pathologically identical with a boil, differing only in its extent, severity, and in the fact that there are several openings formed instead of one. The remarks made on boils are equally applicable to car-

buncles, and the same line of treatment may be followed. Opium is recommended by some.

Ecthyma.—This affection may be either *acute* or *chronic*. The *acute* variety consists of small rounded elevated patches distinct from one another. These patches soon become pustular and surrounded by a red areola. The pustules dry up and become replaced by hard thick adherent crusts. Usually several crops of pustules appear during the course of the eruption, which lasts from 10 to 14 days. This disease is commonly seen on the limbs and neck, rarely on the trunk or head.

Chronic Ecthyma differs from the acute, as above described, in its duration and extent. In this form the eruption invades hitherto healthy skin and becomes extensive. It is accompanied by febrile disturbances, often of a hectic type. It occurs both in infancy and adult life. Children at the breast are sometimes attacked, the face and chest being the common sites of the eruption. It is a dangerous affection, and sometimes terminates fatally. Chronic ecthyma also occurs in adults whose health is undermined, but it may even be occasionally seen in the robust from the action of local irritants as tartar-emetic, sugar, and dirt.

Treatment.—Antipyretics and salines are useful for the acute variety. Locally soothing lotions may be applied.

When the disease occurs in infants at the breast a change of nurse should be resorted to. Fresh air, scrupulous cleanliness, cod-liver oil, and tonics are also indicated.

II. Anomalies of the Epidermis :—

Psoriasis.—The old name for psoriasis was "dry tetter." It commences with an eruption of papules, and on the papules scales form, large, perfectly dry and white, silvery in colour. On removing these the underlying surface of the skin is seen to be red and dry.

Symptoms.—The efflorescence may assume various forms. When the spots are minute the eruption is termed *psoriasis guttata. Psoriasis numularis, orbicularis* (healing in centre), *gyrata, diffusa, universalis*, and *inveterata* are names which are explained by the adjectives used.

Psoriasis makes its first appearance almost exclusively on the *extensor* surfaces especially of the elbow and knee joints. From these situations it may spread upwards and downwards involving the trunk and frequently the scalp and face. Although these localities are the most commonly involved, psoriasis may make its appearance on the palms of the hands and soles of the feet, and the nails may also be affected. Psoriasis of the palms and feet, if unaccompanied by the presence of the eruption elsewhere, should always excite suspicion of a syphilitic origin. This disease is attended by little itch, except during efflorescence, when the itching may be more or less severe, and it runs as a rule a chronic course.

Etiology.—The disease is often hereditary, and attacks both sexes at all ages, being, however, most common from the ages of six or seven to puberty. Its direct cause is unknown, though some attribute its occurrence to a gouty or rheumatic diathesis. In most instances no such influence can be established, and the disease is frequently seen in the robust and healthy. It is true, however, that debility, from whatever cause arising, seems, in those predisposed, to evoke the disease. Thus, prolonged lactation is a frequent cause. Season seems also to have a direct influence in determining the appearance of the eruption. Psoriasis more commonly appears in spring than in autumn, and at these two seasons it is more frequently seen than at any other time of the year.

Diagnosis.—The diagnosis of a typical case of psoriasis is usually easy. The eruption may be mistaken for syphilis, but it may be distinguished from a syphilitic scaly eruption by its locality, by its symmetry, by the silver colour of the scales, and by the absence of a history or other signs of syphilis.

Treatment.—Recovery may be secured by (1) internal or (2) external remedies separately or combined, but it is to be remembered that no method adopted is capable of preventing a relapse.

Liquor arsenicalis, freshly prepared, is often sufficient to effect recovery if given in the following way. Begin with six drops daily, in a teaspoonful of aqua menth. pip., during or after meals, increase one drop every two or three days up to twelve drops daily; then if recovery be delayed increase more slowly, until twenty or even thirty drops are administered. If the patches begin to disappear, gradually diminish the dose. This internal treatment may be satisfactory in slight cases, but as a rule it fails when the patches are large, so that it is advisable to combine it with external treatment, and this external treatment consists in the application of chrysarobin, tar, or pyrogallic acid. Chrysarobin ointment is slowly rubbed in once or twice a day over the affected parts, and under its use the scales shortly disappear and leave a red surface, which in due time assumes a natural appearance. In cases where the disease affects a large surface the patient should remain in bed until the application has effected its purpose. In slight cases chrysarobin paint, consisting of chrysarobin 1, pyrogallic acid 1, collodion 120, ether and alcohol equal parts sufficient to dissolve, is an effective remedy. It should be applied to the spots on alternate nights. It does not stain the linen.

In the application of tar the scales must first be removed by natural thermal waters or warm sulphur baths, or by protracted baths in warm water, or by rubbing the scaly parts with ℞ sapon. virid. 50, sp. rect. 100; macerate for 24 hours, then filter and add 10 of spirit of lavender. The tar is afterwards applied, either pure or diluted, once or twice a day by rubbing it in with a soft brush. After the application the patient should remain in bed under woollen blankets for a number of hours. It is necessary to wear flannel next the skin, as the tar adheres very firmly to the clothing. If the scaling continues for some time the old layer of tar with

the scales should be removed by a warm bath, soap, and spirit, before a fresh application is made. The formula given may then be employed advantageously. Pyrogallic acid in a 5-10 per cent solution, or in the form of an ointment, may be applied to the patches with a brush once or twice a day. Its action is slower than that of chrysarobin, but it has the advantage of not staining the linen as deeply as the latter drug. During the pyrogallic acid treatment tepid baths should be taken a number of times and then soap should be rubbed on the affected parts. The application of benzine removes the light brown discoloration left by this mode of treatment.

Pyrogallic acid treatment should only be adopted when the patches are small, for if it be applied to large patches grave symptoms from absorption may ensue.

LICHEN.—Lichen is an inflammatory affection of the skin, usually chronic in its course, and characterised by an eruption of more or less acuminated papules clustered together or scattered thickly over the surface of the skin, attended with much itching and succeeded by a reddened and thickened condition of the skin. There are several varieties of this disease described, but only three demand attention :—

LICHEN SIMPLEX.—Here the surface of the skin involved is of little extent and has no definite outline. The papules are about the size of a millet seed, and are chiefly found on the back and extensor surfaces of the limbs. This variety is comparatively mild, and is considered by some to be simply abortive papular eczema.

In LICHEN CIRCINATUS the papules are arranged in round groups, or, more commonly, in perfect rings which spread circumferentially, leaving the skin in the centre either normal or stained of a yellowish-red colour. These patches occur generally on the chest and back.

LICHEN PLANUS (Lichen Ruber) is a more important disease. The papules in this disease differ from those ordinarily found in being large and flat instead of small and acuminated. The surface of the papules is smooth,

shining, and polished, as if they had been rubbed down by long-continued friction. Their colour is characteristically of a lilac hue, or of a deep purplish-red. The disposition of the eruption is peculiar. The patches, which are often symmetrical, occur at first on the limbs and subsequently on the body, and the individual papules of which they are composed are commonly arranged in long rows in single file, each papule being apart and discrete, so as to form dotted lines extending down the limb.

What is known as *lichen agrius* is simply acute eczema; it constitutes the "grocers'," "bakers'," and "bricklayers'" itch. In it the papules are situated on red inflamed skin; there is much pain, tingling, and heat, with general feverishness, nausea, and vomiting; the tops of the papules are often broken off, and there is in consequence a thin serous discharge, the skin being left fissured with deep and painful cracks. In the lichen of scrofulous subjects, *l. scrofulosorum*, a very chronic variety, the papules are very small and pale, appear only on the trunk, cause almost no itching, and are arranged in patches or circles. *L. tropicus* is known as "prickly heat."

Treatment.—In lichen the local treatment consists in allaying the severe itching by baths, sedative ointments, or lotions (F. 55*a*, 57*a*), or by weak tarry applications (F. 60*a*, 64*b*), while the digestion is aided by mild laxatives and a simple diet. Cleanliness must be insisted on. In *l. circinatus* especially, and also in the other forms of lichen, arsenic is most valuable. In *l. scrofulosorum* cod-liver oil must be used, both internally and externally.

Pityriasis Rubra is a formidable complaint, not unfrequently fatal and often accompanied by renal disease and albuminuria. It is characterised mainly by intense redness of the entire surface of the body, excessive exfoliation of epidermis, and absence of infiltration of the skin and of moist exudation. The skin is tender, but not

very itchy. The constitutional symptoms are severe, and are those chiefly of exhaustion and debility. It is by some regarded as a dry, universal form of eczema. The vivid redness of the skin and the great size of the epidermic flakes which fall off, sufficiently distinguish it from other desquamative diseases.

Treatment is not satisfactory, though Fox states that by soothing applications externally and the administration of diuretics and then tonics internally, really remarkable results may be obtained. The tender surface is thus protected, while the hyperæmia is subdued and tone and strength are restored to the system.

PEMPHIGUS (*Synonym*, Pompholyx).—The eruption, in this affection, consists of large watery blebs or bullæ, filled with transparent or turbid fluid. These blebs vary in size from a millet seed to that of an apple, and occur on different parts of the skin and mucous membrane. When the bleb is broken and healed it leaves a dark stain or a thin crust.

The disease, which follows an *acute* or *chronic* course, is preceded by fever and constitutional disturbances, and locally by irritation and itching. Generally the prognosis is favourable, and the blebs dry up without leaving cicatrices. This skin affection is due to debility favoured by intemperance, bad diet, or cold, or it may be due to syphilis. Several varieties of the disease have been described :—*P. Neonatorum*, peculiar to new-born children, is a grave disease, and usually terminates fatally. *P. Foliaceus* is characterised by rapid formation and equally rapid rupture of the bullæ, leaving large readily detachable flakes.

RUPIA is generally syphilitic in its origin. Small flat bullæ arise, and their contents, which consist at first of serous fluid, soon degenerate into blood and pus. A thick black scab is formed, and beneath it unhealthy ulceration progresses, as indicated by a nasty-smelling discharge. The margins of the surrounding skin inflame,

more serum is poured out, and the incrustation takes on a stratified appearance, resembling a limpet shell. The lower limbs and loins are the usual sites of rupia. Its duration may vary from two or three weeks to several months.

Treatment.—These diseases being attended with debility, it is essential to use means which will combat this, viz. tonics, a generous diet with wine, and fresh air. If the eruption be of syphilitic origin, iodide of potassium with pil. hydrarg. subchlor. co. (Plummer's pill) or the perchloride of mercury should be prescribed (F. 1). In non-syphilitic pemphigus, liquor arsenicalis in 3-minim doses, after food, is a most efficient remedy. Locally, poultice and use antiseptic dressings (F. 2, 3); or better, dust the sore with iodoform.

Cheiro-pompholyx.—This affection is marked by an eruption, invariably symmetrical, of small round vesicles or blebs, chiefly on the hands and feet, and attended by little or no redness of the skin, and by no eczema; it is very apt to recur. The vesicles are deep-seated and flat on the top, and soon dry up and scale off; they contain a clear, alkaline, serous fluid. The nails also are often attacked, being loosened and broken across at the root.

Treatment.—As the disease often appears in nervous and debilitated subjects, tonics, such as quinine and iron, will be useful. Locally, simple vaseline may be applied, or vaseline with a little tar ointment or liq. carbonis deterg.

Ichthyosis (or *fish skin*) is simply an exaggeration of the condition known as *xeroderma* or dry skin. It is usually hereditary, and is marked by suppression of the sensible perspiration and an increased development of epidermis. The skin is therefore dry, harsh, scaly, and cracked, the peculiar shape of the scales giving the disease its distinctive name. It appears first and is most severe on the extensor aspect of the joints.

Treatment.—The disease is incurable, but the patient

may be made more comfortable by warm baths, followed by thorough inunction with almond oil or glycerine and water. Cod-liver oil should be given internally.

III. New Formations (Chronic Infectious Diseases of the Skin).

Lupus is a chronic skin affection, usually occurring in young persons of tubercular or scrofulous temperament, characterised by a cell infiltration of the skin of a peculiar purplish-red colour. It terminates in cicatrisation with or without ulceration.

Lupus is the principal tubercular skin disease seen in this country. It occurs most frequently on the face, and attacks chiefly the nose and cheek. It may occur on any other part of the body, and by many dermatologists is then not designated Lupus but "Scrofuloderma." The disease is almost always insensitive.

Lupus Vulgaris assumes two aspects or varieties. In the variety known as *lupus exedens* the nodular deposits ulcerate; in *l. non-exedens* they do not. In the non-ulcerative form the nodules, which are small, softish, and red, and attended by no pain, become covered with little white scales. Then a sort of fatty degeneration occurs, the nodules shrink and die away, and leave a depression due to a loss of substance. In the other form ulceration instead of absorption sets in, the neighbouring tissues are invaded, and the edges are thick and red. It sometimes destroys the nose, including the mucous membrane and bones.

Treatment.—The scrofulous nature of lupus necessitates the use of tonics, especially cod-liver oil combined with syr. ferri iodidi or with acids and bitters. In the severe form, if there is any history of syphilis, use Donovan's solution or iodide of potassium with sarsaparilla. Locally, for the non-ulcerating form Sir Erasmus Wilson recommended the acetum cantharidis; while for the ulcerating type caustic applications are called for, such as chloride of

zinc, nitric acid, or potassa fusa, or the lupous tissue may be scraped away with a curette. The thermo-cautery applied under chloroform is specially serviceable, and leaves little after pain. In addition many other methods of treatment have been advised and carried out with a variable amount of success by different dermatologists. Dr. H. S. Brooke advises the use of a paste, consisting of the following ingredients, to be applied to the lupus patches at the outset of treatment:—℞ hydrarg. oleatis ʒi, acidi salicylici grs. v.-xv., ichthyolis ♏xv., olei lavandulæ q.s. This application in many instances is effectual, and can be applied without pain. As the skin becomes accustomed to an irritant application its strength may be increased. If caustic applications after prolonged trial seem to give rise to irritation their use should be suspended, for in the case of adults long-continued irritation induced by such remedies has been known to evoke epithelioma. When a patient is instructed to apply an irritant remedy himself he should be warned that the skin should not be broken by the action of the application. If any signs of excoriation manifest themselves the remedy should be discontinued or used in a more dilute form. Favourable results have been obtained by Landerer, especially as a preliminary form of treatment, by the continuous use of balsam of Peru.

It is here right to mention that although Koch's "tuberculin" does not appear to have been used in phthisis with much success, in lupus more benefit has been derived from its employment. Certainly it appears to induce improvement in the lupus patches more rapidly than any other method of treatment heretofore adopted, but whether the improvement is of an ephemeral or permanent nature will require the further lapse of time to determine.

For the characters of Syphilis see p. 96; for Glanders, p. 105; for Frambœsia (Yaws), p. 152; for Leprosy, p. 150. With reference to Leprosy we may add that there are two varieties—Elephantiasis tuberosa and Elephantiasis anæsthetica; a sub-group of the latter

causes dislocation and amputation of the joints, and is hence termed Elephantiasis mutilans.

IV. Neuroses of the Skin :—

Pruritus (*prurire*, to itch) is, strictly speaking, the name rather of a symptom than of an independent disease, but there are affections so styled indicating mainly an involvement of the cutaneous or general nervous system, characterised first and chiefly by fierce itching, and often followed by secondary changes in the skin. Pruritus may be due to local irritation ; to the presence of a poison in the blood, as bile, sugar, and the gouty and rheumatic poisons ; to reflex changes, as from pregnancy or uterine disorders ; or to senile changes in the skin.

As a separate disease three special forms of pruritus are noted :—

1. *Pruritus genitalium.*—This form is seen in diabetes, and in women at the change of life, or when suffering from disease of the os uteri, or when pregnant. In men it depends on eczema or uncleanliness ; and in both sexes it may be due to the presence of pediculi pubis.

2. *Pruritus ani.*—In adults this form is connected with piles, eczema, or constipation ; in children, with threadworms.

3. *Pruritus senilis.*—This form is met with in old age. The skin is atrophied, sometimes pigmented ; it is studded with small papules, and shows indications of vigorous scratching. The itching, which is at times unbearable, and has led to actual suicide, is sometimes accompanied by a burning or gnawing pain, or by a feeling as if animals were boring their way through the skin.

Treatment.—Remove local irritants ; attend to the action of the bowels ; give generous diet, tonics, and cod-liver oil, with bromide of potassium at night to procure rest. The Turkish bath, followed by a shampooing and the inunction of vaseline, is sometimes of service. Tar and sulphur are often useful if the affection is due to pediculi vestimentorum, as in the form of liquor carbonis

detergens (Wright's), or in a bath of sulphide of potassium—4 ounces to 30 gallons of water. For *pruritus genitalium* use the glycerine of borax, and for *pruritus ani* an ounce of zinc ointment mixed with 60 grains of calomel, or lotions of tar with borax or dilute prussic acid.

PRURIGO has the same derivation as pruritus, and is sometimes dependent on the same causes. It is marked by intense itching and by the development of numerous isolated pale pinkish papules. In this country, as *prurigo simplex* or *mitis*, it affects chiefly the under-fed and badly-kept children of the poor. The first step in the pathological process is the presence of some irritant, as dirt or parasites; this is followed by a papular eruption, chiefly on the back, the thighs, and extensor surface of the limbs. The itching is severe. The disease may last a few years, and gradually disappears as age advances.

The prurigo of Hebra is not uncommon on the continent, but it is rare in Britain. In it the papules are at first very small, pale, isolated, and scarcely visible, but the skin is rough to the touch. The itching is intense, and from scratching numerous blood crusts form. The skin becomes thickened and deeply pigmented. The eruption appears chiefly on the trunk and extensor surface of limbs, and when fairly established usually lasts through life. Hutchinson's relapsing prurigo usually first appears at the age of puberty. The papules here are decidedly red, often accompanied by erythema. As the name indicates, it is apt to recur, and its severity is greater in summer.

Treatment.—In Hebra's prurigo endeavour to improve the general health, see that the patient sleeps, and use soothing local remedies. For the prurigo of children, alkaline or sometimes tar baths, soothing ointments, the removal of the existing irritants, and the administration of small doses of quinine and rhubarb, will generally effect much improvement.

HERPES is an acute non-contagious affection characterised by the development of groups of vesicles or blebs

on circumscribed erythematous patches of skin. The eruption is accompanied in many instances by burning and intense pain, which may continue long after the disappearance of the vesicles. This skin affection lasts from six days in the simplest forms to twenty-one in the more complicated. The many varieties described are distinguished according to the locality, form, and grouping of the vesicles.

Herpes in its simplest form is sometimes seen on the lip and mucous membrane of the mouth in acute pneumonia or during the progress of a common cold, or on the prepuce as the result of sexual connection or of a constitutional rheumatic tendency. Hence the terms Herpes Labialis (H. Facialis) and Herpes Preputialis. A variety called Herpes Circinatus consists of a ring ($\frac{1}{2}$ to $\frac{1}{3}$ of an inch broad) with smooth skin in the centre varying from $\frac{1}{4}$ of an inch to 2 inches in width. The vesicles are often very minute, and, when they dry up, seem covered with small scales.

Another variety to which considerable interest is attached, from its peculiar situation and its antiquity, for it was known to the ancients, is popularly designated "shingles," "zona," and "Herpes zoster."

The eruption of herpes zoster is attended frequently by a chill and by intense local pain, either before or following on the decline of the eruption, so that it is looked upon as a neuro-dermal disorder, developed on the line of skin supplied by the affected nerves. This line, in nineteen cases out of twenty, follows the course of the intercostal nerves on the right side, in the position that would be occupied by a sword-belt. On this ground-work red patches appear of irregular oblong shapes, varying in size from two to three inches; next papules are seen scattered over the surface affected; then vesicles are observed at first minute, then larger, and frequently two or three, when they reach the size of small bladders, run into each other. The vesicles at first contain clear fluid, which becomes white and opaque, and afterwards purulent. Then the vesicles collapse and give rise to small black scabs,

deeply embedded in the skin; after a time the scabs fall and leave depressions, which may be visible for several weeks. A similar eruption may follow the course of any of the cutaneous nerves. The *acute* course of the affection lasts from fourteen to twenty days.

Treatment.—Regulate the diet and attend to the bowels. Employ locally the prussic acid lotion (F. 57*b*), or dust the part with a powder consisting of three parts of starch and one part of oxide of zinc. If the pain be severe, as it sometimes is in shingles, it may be necessary to use aconitina ointment, or to inject morphine in the course of the nerve. Protecting the part by means of cotton wool is frequently very beneficial; so also is the application of a coat of collodion, but this should be painted on before the vesicles break.

V. Anomalies of Growth and Colour of Hair:—

Hirsuties, or undue growth of hair in abnormal situations, may sometimes be cured by the cautious use of depilatories (F. 65*e*). A more satisfactory method of treatment is to destroy the hair-papilla by means of a needle thrust to the bottom of each follicle, or by means of the electrolytic needle, the inflammation so excited obliterating the hair follicle completely.

Alopecia (or baldness) may be the result simply of hereditary peculiarity, or of ordinary senile atrophy, in which the hair-papilla takes part with the other tissues; or it may be due to syphilis, the eruptive fevers, parasitic disease, seborrhœa, or nervous affections.

Treatment.—While the cause of the baldness must be specially treated, the growth of the hair may be favoured by stimulating local applications (F. 62), and by general tonics. In syphilis, the hair will certainly grow again under suitable constitutional treatment.

Alopecia Areata is a disease of the hairy scalp, characterised by the development of localised, usually circular, patches of baldness.

Many views have been advanced as to the pathology of this affection. Some dermatologists classify it along with the parasitic skin affections, while others maintain it is a tropho-neurosis.

Those who believe it to be due to a parasite call this disease *Tinea Decalvans* (or smooth ringworm), and assert that it is produced by the presence of a fungus—the microsporon Audouini.

More recent investigations, however, do not bear this view out, and the disease would seem to be really a neurosis of the scalp affecting the nutrition of the hair. This theory seems to be supported by these facts :—The disease is apt to occur in people of neurotic temperament, and those who suffer from habitual cranial neuralgia or headache would seem to be specially predisposed. Besides the application of parasiticides—apart from their stimulant action—does not seem to benefit the condition.

Treatment.—The bald patches should be stimulated by the application of mild irritants, such as ointment of oil of cade or tincture of iodine. If these fail, stronger applications of cantharides ointment or blistering fluid may with advantage be resorted to. With the local treatment, the internal administration of nervine tonics, as a pill of phosphorus and strychnine, or Easton's Syrup, should be combined.

VI. Anomalies of Pigmentation :—

Synonym, Chromatopathic Affections.

1. Excess of Pigment.—Excess of colour may be general or partial. In either case it is represented by increase of the normal pigment of the skin, giving rise to various shades of hue, ranging from olive to deep black. Examples of excess of pigment are seen in *Chloasma* and *Melasma*.

2. Deficiency of Pigment.—Defect of colour in the skin is due to absence or deficiency of pigment, and this may occur either in the rete mucosum or the hair. As a general affection, it constitutes Albinism—the subject of it being known as an Albino ; while as a disease, it is termed *Leucopathia*, and its examples are *Achroma* and *Leucasmus*.

3. Aberration of Normal Colour. — Alteration of the colour of the skin is manifested by an excess of the elements which enter into the composition of the normal brown or black. Thus it may be yellow or olive (*Xanthochroia*), as in Ephelis and Lentigo. Excess of yellow-blue—a rare affection—is termed *Cyanochroia*.

4. Artificial Colouring of the Skin.—*Argyria* or *Melasma Tinctum* occurs from the prolonged internal use of the nitrate of silver. The seat of the discoloration is the papillary layer of the corium.

A slight functional disorder may occasion arrest of the pigment-formation to a varied extent and become the cause of Achroma, as illustrated in the instance of the piebald negro. Lentigo is one of the commonest forms of Melasma, and is a natural concomitant of a delicate skin. Ephelis solaris and Ephelis ignealis result from the action of heat. "Copper colour" is a form of Melasma, and is seen in syphilitic affections. Morphœa and Scleriasis are accompanied by Achroma as well as Melasma, and so also to a greater degree is Elephantiasis. The prolonged use of arsenic gives rise to Melasma. Melasma with Achroma is sometimes associated with hysteria, nervous shock, and notably with Addison's disease—"bronzed skin." Melasma is generally seen in prurigo.

Prognosis.—The skin rarely returns to its normal state, and the prognosis is thus unfavourable.

Treatment. — Pigmentary affections are usually associated with constitutional derangement, and therefore require internal treatment, while the discoloration may be dealt with by local remedies. Of the latter the most effectual are alkaline lotions and ointments, lotions of acetic and hydrochloric acid, or of iodine and iodide of potassium. Hydrargyri perchloridum in Mistura amygdalæ will remove freckles and the slighter forms of Chloasma; and the pigment is sometimes restored by the stimulation of Cantharides. Friction is serviceable in every form of pigmentary discoloration.

VII. Anomalies of Secretion:—

(*a*) *Sebaceous Glands.*

1. Hypersecretion.

Acne (Acne Vulgaris).—Common acne begins by the appearance of inflamed elevated red points. At the centre of each a pustule forms surrounded by a red base. The pustule bursts, and its contents are discharged.

The disease is chiefly situated on the back and face, and occurs principally in young adults of both sexes during the changes occurring at puberty. It is caused by obstruction in the duct of a sebaceous gland. The sebum either solidifies or the mouth of the duct may

become blocked by external dirt. In either case a *comedo* (shillcorn) is formed, which is marked by the appearance of a black dot. The dark point is due to dirt entering the orifice of the gland. This condition forms *acne punctata*. Nature's method of expelling a foreign body is brought into action. Suppuration takes place, which softens the hardened core of sebum, and by and by it is expelled by the rupture of the small abscess which forms. A small permanent circular cicatrix is formed if the disease is severe or occurs in strumous or debilitated subjects.

Another form of the disease, when there is much surrounding induration, is called *acne indurata*.

Acne Rosacea is confined almost exclusively to the face, and is seen chiefly on the alæ nasi and about the mouth. It is associated with a hyperæmic condition of the skin forming bright red or purplish patches. In chronic cases the skin is apt to become rough and coarse, and varicose and tortuous vessels are seen winding over the surface. If the disease is not checked, a hypertrophic condition is apt to follow, and the nose frequently assumes enormous dimensions (acne hypertrophica).

Acne Rosacea is commoner in females than males, and occurs in middle life. The disease is one of debility, from whatever cause arising, and it is often, though not always, associated with intemperance, good living, or diseases of the stomach and liver.

Sycosis is a pustular eruption confined to the hairy portions of the face. It is brought about by inflammation in the hair follicle, or oftener in the sebaceous gland in connection with the hair. Sometimes the disease is called *eczema pilare faciei*, and it should be distinguished from ringworm of the head—tinea sycosis.

Treatment.—In *acne vulgaris* and *indurata* the treatment to be adopted is to remove the comedones as soon as they are detected. This is best done by means of the comedo tube or scoop. The face may with advantage be

steamed at night, and this may be followed by vigorous friction. Strong stimulating applications, such as iodide of sulphur ointment (F. 65), suitable enough for mild and chronic non-inflammatory cases, must in the severer pustular forms be used with caution. A course of calcium sulphide in pill is often an effective means of arresting the tendency to pustulation, and large doses of cod-liver oil are beneficial.

Acne rosacea is best treated and controlled by carefully regulating the diet and forbidding alcoholic excesses. Sometimes when the disease is produced by debility, not induced by intemperance, a small quantity of wine is useful. Local stimulating applications are helpful, and the painting of the parts every night with liquid extract of ergot is said to be followed by improvement. In *sycosis* the affected part should be closely shaved and salicylic acid or zinc plaster applied according to the amount of inflammation present. If there is much inflammation, the latter should be employed first. Sometimes epilation, followed by the application of astringent and soothing ointments, effects a cure.

2. Decreased Secretion or Xerosis is associated with a dry and harsh condition of the skin. Emollients may be employed, and the use of too much soap should be avoided. Large doses of cod-liver oil should be taken.

(*b*) *Sweat Glands.*

1. Quantitative Changes of Sweat.

Hyperidrosis, Excess of Perspiration.—This is supposed to depend on the vaso-motor nerves, but in what manner is still obscure. It may be either general or local. General hyperidrosis arises from various causes, as acute rheumatism, gout, intermittent fever, phthisis, general debility, alcoholism, defervescence of febricula, emotional excitement, exercise, and hot weather. It is also produced by diaphoretics and the Turkish bath.

Local hyperidrosis usually occurs on one side of the body, the face, or the head. It may be seen in hemiplegia following

central hæmorrhage. It is sometimes hereditary, and is occasionally limited to the palms of the hands and the soles of the feet.

ANIDROSIS, or deficiency of sweat, is a symptom in diabetes mellitus and chronic Bright's disease. It accompanies the early stages of fever, and is present when the skin is dry, as in psoriasis or ichthyosis.

2. Qualitative Changes of Sweat.

CYANIDROSIS or CHROMIDROSIS.—In this rare condition the sweat assumes various colours.

HÆMATIDROSIS. — This is called "bloody sweat." Doubt exists if it ever occurs spontaneously. In a number of the cases reported the condition seems to have been due to self-inflicted punctures.

Treatment. — In excessive sweating — Hyperidrosis — dilute sulphuric acid and other astringent tonics are useful. Flannel instead of cotton should be worn next the skin, and sponging with vinegar and water is recommended ; or use lotions ℞ acid. sulphurici diluti ℥ii, aquæ Oi, or ℞ acid. tannici ℥i, spiritus rectificati ℥vi. Atropine injected subcutaneously checks the perspiration of phthisis, and belladonna liniment is useful in excessive perspiration of the hands.

For osmidrosis—fœtid sweating—tar soap, frequent changing of linen, and thorough drying are recommended. Internally, give tincture of belladonna. Hebra's prescription for fœtid sweating of the feet is "℞ olei olivæ optimæ ℥xv, lithargyri ℥iii et ℥vi. Boil. Make an ointment, and apply on strips of linen every twelve hours." Cork soles should also be worn.

VIII. PARASITIC AFFECTIONS OF THE SKIN :—

(*a*) *Animal Parasites.*

SCABIES depends on the presence of an animal parasite, the *acarus scabiei* or *sarcoptes hominis.* The acarus is rounded, somewhat like a tortoise in general shape, and is provided with eight legs. The male is smaller than the female, and wanders freely over the surface. The female pierces the cuticle, and forms under it a short S-shaped burrow (*cuniculus*), at the end of which is a small vesicle within which the insect lies ; in the burrow will be found ten to fifteen black dots, the insect's eggs.

It most frequently attacks the flexures of joints; notably it is first observed between the fingers, whence it may spread over the whole surface of the body with the exception of the face, upon which it is never seen save in a few cases in infants. The deposition of the acarus acts as an irritant; a vesicular eruption is formed, and with this is associated much itching, which is specially increased by warmth. The only certain evidence of the presence of the disease is the discovery of the insect and its burrows, but in the absence of this the following points are usually held to warrant such a diagnosis:—(1) A clear history of contagion, several members of the same family being generally affected; (2) the steady spread of the disease from one part to another; (3) intolerable itching, intensified by warmth, pain and the burning sensation characteristic of eczema being absent; (4) the detection of small pointed vesicles between the fingers and on the flexor and ulnar aspects of the wrists, with a pruriginous eruption on the front of the forearm, on the mammæ, genitals, and inner side of thigh, the face and scalp being in adults invariably untouched. A valuable diagnostic sign in children is the presence of the eruption round the ankles, on the buttocks, and on the ulnar side of the wrists.

Treatment.—The acarus is most easily destroyed by the application of sulphur ointment (F. 60*b*). This should be rubbed in firmly for three nights in succession, and washed off by a warm bath on the fourth day, when the underclothing should be changed. The clothes worn should be fumigated by sulphurous acid gas, or destroyed. If the sulphur be continued too long, it gives rise to a very troublesome artificial eczema. In infants, and those whose skin is too irritable to bear the sulphur application, storax (F. 60*c*) may be used.

Pediculosis (*Synonym*, Phthiriasis) is the condition of skin induced by uncleanliness and the harbouring of lice about the person. There are three varieties of pediculi. The *pediculus capitis* infests the head, especially

of children, where its presence excites great itching and irritation, the scratching to which it gives rise occasionally causing eczema. The "nits" or ova of the lice, small white bodies, adhere to the shaft of the hair. The *pediculus corporis* is larger than the head louse, and its ova are deposited on the clothing, not on the skin. The itching which it excites is intense. The great irritation brings out numerous small pale papules, especially on the breast and back; the tops of these are scratched off, and are usually seen covered by a small scale of coagulated blood. After some time the skin deepens in colour from increased pigmentation. The *pediculus pubis* is found chiefly about the genital organs, or occasionally in the armpits, or in the eyebrows and eyelashes. It is seldom seen in children.

Treatment.—For head lice or pediculi pubis nothing is better than carbolic oil (1-8) or the 5 per cent solution of oleate of mercury. If the latter remedy be combined with a little acetic ether it will rapidly destroy the nits. Carbolic lotion (1-20) will kill body lice; but the clothing should also be exposed to the action of dry heat at a temperature of at least 250° F. The disease of the skin engendered by the presence of the pediculi is "easily cured by means of an ointment containing one part of the oil of delphinium staphisagria and seven parts of lard" (Liveing).

(*b*) *Vegetable Parasites.*

Favus or Tinea Favosa (Honeycomb Ringworm), a very obstinate and chronic affection, is due to the presence and growth of a fungus, the *achorion Schönleinii*. It is most commonly met with on the scalp, though it may occur on other parts of the surface. In the early stages the patches are irritable and scaly, and the hair becomes harsh, dry, and quite lustreless; bright sulphur yellow crusts, small and distinctly cup-shaped, are soon formed, and through the centre of each of these pass a few hairs; eventually the crusts fall off, leaving dark stains and a

scaly surface. The pressure of the fungus may destroy the hair-papilla, when permanent baldness results. The odour of the parts is said to be like that of cats or mice.

Along with the development of the favus cups the hair undergoes change. It loses its lustre, colour, and pliability. Consequently over the affected area it looks woolly and stubbly.

The disease is considered by many to be acquired from mice through the cat, children who play with a diseased cat becoming affected.

Upon examination under the microscope, a favus cup is seen to be almost wholly composed of the fungus, and the spores and mycelium can be readily detected. If a diseased hair, which is easily and usually painlessly extracted, be examined on a microscopic slide under a high power, after being treated with a drop of liquor potassæ, the same spores and mycelium can be seen throughout the structure of the hair. The spores of tinea favosa may be distinguished from those of tinea tricophytina by their non-uniformity in size.

Ringworm (Tinea Tricophytina) is a parasitic disease caused by the fungus *tricophyton tonsurans*. It presents different appearances and receives different names according to the situations in which it occurs. When it attacks the scalp it is known as *tinea tonsurans*; on the hairy part of the face, as *tinea sycosis*; and on the general surface of the body, as *tinea circinata*.

Tinea Tonsurans is commonly seen in children, rarely in adults. At the outset the rings or patches are simply red, slightly raised, with a few small vesicles at the edges; subsequently there are observed round or oval, scaly or scurfy patches of comparative baldness, on which the hairs are dry and shrivelled, usually broken off short at the surface of the skin or a line or two above it, in such a way as to suggest the appearance of a stubble-field; the hairs are brittle and apt to break just within the follicle when epilation is attempted. At a still later stage the diseased part of the scalp may become inflamed, soft, and

boggy, as if the seat of an abscess, and the follicles may suppurate or discharge a clear gummy fluid; this is the condition sometimes described as *tinea kerion*, and is one of nature's methods of cure. In disseminated ringworm of the head the scalp is scaly, with here and there a few dry, shrivelled, and brittle hairs, and a few of the stumps above mentioned.

Tinea Sycosis is characterised by pustular inflammation of the hair-follicles, the pustules being placed on little hard eminences, and terminating in yellowish-brown crusts.

Tinea Circinata is marked by distinctly circular patches, which tend to spread steadily at all parts of their circumference; in extent they vary from the size of a shilling to that of a half-crown; their margins are red, raised, and slightly vesicular, while the centre has a yellowish-brown colour and has a tendency to scale.

Tinea Versicolor (Pityriasis versicolor, Chloasma) is produced by the growth of the *microsporon furfur*. It is characterised by the occurrence of yellow or fawn-coloured patches, often very symmetrical, on the chest and abdomen, occasionally on the upper arm or thigh; these are rough to the touch, and covered with fine branny scales. It is sometimes accompanied by considerable itching, and is a disease of adult life, and never attacks uncovered parts. Its development is favoured by want of cleanliness and by diseases associated with colliquative sweating, as phthisis pulmonalis.

Treatment.—In all forms of tinea this must be both local and general; local to destroy the parasites, general to strengthen the system and prevent the skin forming a suitable soil for their development. The general treatment consists in cleanliness, good hygienic conditions, nourishing food, cod-liver oil, syrups of the phosphate or iodide of iron (F. 81, 85).

Locally, poultice to remove scabs; clip the hair and epilate carefully in and around the diseased patches, this epilation being particularly necessary in favus and tinea sycosis; afterwards, some parasiticide application must

be employed, such as sulphurous acid, either pure or diluted, or oil of cade. In favus the part may be blistered, or a lotion of corrosive sublimate (F. 58, 58*a*), or the white precipitate ointment, should be used perseveringly; hyposulphite of sodium lotion, 60 grains to the ounce of water, is also effectual. In ringworm of the body a solution of nitrate of silver, or tincture of iodine, or acetic acid, is sufficient. For sycosis employ, after epilation, F. 65 or any of the ordinary parasiticides. Ringworm of the head, if extensive, is obstinate; for it, after carefully extracting the diseased hairs, apply oleate of mercury, sulphurous acid, carbolic acid and glycerine, or Dr. Alder Smith's *compound citrine ointment* (F. 57*g*, 65*b*, 65*c*). In ringworm, according to Dr. Lee, begin by shaving the head. Destroy hat or cap worn before treatment. Then treat by rubbing in the following preparation :— ℥i of precipitated sulphur is to be mixed with ℥i of olive oil till a thick cream is produced, to which is added gr. 32 of Calvert's carbolic acid. Nurses may convey the contagion on leaving their situation, or a cap brought from an infected house may do so. Tinea versicolor is readily removed by vigorous rubbing with soft soap and warm water applied with a piece of flannel; F. 58*a* is still more effectual. In Tinea decalvans (alopecia areata) blister occasionally, or use F. 58.

IX. Medicinal Rashes :—

Certain drugs, taken internally, are apt to give rise to skin eruptions. Belladonna or its alkaloid, stramonium, and hyoscyamus sometimes cause intense hyperæmia, closely resembling the eruption in scarlet fever. Quinine sometimes brings out patches of erythema; arsenic, a purplish staining of the skin or a herpetic eruption; iodide of potassium, purpuric spots on the legs, or pustules, like those of acne, on the face, back of neck, and shoulders; copaiba, a dark red, raised, hyperæmic or hæmorrhagic rash, not unlike that of measles, seen most

commonly about the ankles and wrists; bromide of potassium, erythema and acne round the mouth and nose; chloral hydrate, a dusky erythematous eruption, sometimes combined with urticaria, found most often about the face and neck; mercury, an obstinate form of eczema; tar and allied substances, a very itchy variety of erythema.

The external use of certain drugs is apt to give rise to skin eruptions. Thus, tar sometimes produces a form of acne; arnica, an erysipelatous inflammation; while the erythema caused by mustard, turpentine, or other irritants, is often followed by desquamation and brown staining, which may be permanent. Croton oil and remedies of a similar nature sometimes excite a very acute eczema, which leaves well-marked cicatrices. The croton-oil eruption may be mistaken for small-pox.

Treatment.—These eruptions, after the drug which has caused them has been withdrawn, should be treated simply on general principles.

APPENDIX

THERAPEUTICAL INDEX

ACNE.

Sulph. Iod. (F. 65).
Sulphur Lotion (F. 57*f*). } Removal of Comedones, then use as a lotion, ℞ Hydrarg. Perchlor. gr. ii., Glycerini ℥ii., Aquæ ad ℥vi. M.

AGUE.

Quinine (20 to 30 grs. at the close of the paroxysm); or hypodermically (p. 255).

Mineral Spas.—Bath, Cheltenham, Carlsbad, Marienbad, Tarasp, Spa.

ALOPECIA.

Pilocarpine hypodermically, or (F. 62).

ANEURYSM.

Spare dry diet; avoidance of excitement; Iodide of Potassium (p. 283).

ANGINA PECTORIS.

Inhalation of Nitrite of Amyl when attack occurs; to prevent recurrence at first 1 m. of 1 per cent of solution of Nitro-Glycerine, increasing dose to m. 10.

Tranquil life; abstinence from alcohol and tobacco.

APOPLEXY (Cerebral Hæmorrhage).

Question of Venesection (p. 489). Croton oil or enemata. Rest in bed with head and shoulders elevated. Only after three or four weeks from seizure use constant current; massage.

ASTHMA (F. 51).

Inhalations (Potass. Nitras, Stramonium cigarettes). Iodide of Potassium (F. 5). Lobelia Mixture (F. 46). Arsenic

(F. 4). Nitrite of Amyl capsules. Strong coffee. Quebracho Tinct. ℥ss.-℥i.; chloroform inhaled during paroxysms.

Climatic Treatment.—Amélie-les-Bains, Bournemouth, Montreux, Isle of Wight.

BED-SORES.

If unbroken, alum and brandy. Collodion, Tannic acid.
If broken, charcoal poultice, and Iodoform dusted on.

BILIOUSNESS (F. 23).

Calomel (F. 23). Rhubarb, aloes (F. 26). Jalap, Syrup Zingib., Decoct. Aloes Co. (F. 25). Podophyllum (F. 27*a*).

Mineral Spas. — Carlsbad, Kissingen, Homburg, Tarasp, Leamington.

BRIGHT'S DISEASE.

Acute.—Warm-bath, hot fomentations, dry cupping. Elaterium and Ext. Colocynth. Co. (F. 27). Potass. Acet., Squill, Sp. Eth. Nit. (F. 37, 37*a*).

Chronic.—Wearing flannel, milk diet.

Elaterium (F. 27). Pilocarpine (F. 34*a*). Iron (F. 76, 77, 78, 79). Potass. Iod. (F. 5).

Extreme cases, Southey's drainage tubes.

Pure Iron Springs. — Alexisbad, Brückenau, Schwalbach, Spa.

Compound Iron Springs.—Homburg (Luisen), Tunbridge Wells, Marienbad, Pyrmont, St. Moritz.

BRONCHITIS (Acute).

Early Stage, hot poultices of linseed meal. Vin. Ipecac., Tolu, Acacia (F. 45).

Vin. Antimon. ℥iiss., Sp. Chloroformi ℥iii., Aq. Camph. ℥v., a tablespoonful every two hours.

Vin. Ipecac., Liquor. Ammon. Cit., Tinct. Camph. Co. (F. 34).

After acute stage is past, Carbonate of Ammonium, Infusion of Senega.

BRONCHITIS (Chronic).

Medicinal Treatment.—Tolu, Ammoniacum, Opium (F. 43). Squill, Acid. Sulph. dil., Tinct. Camph. Co., Cascarilla (F. 21). Terebene.

Ammon. Chlorid. gr. 6, Sp. Chlor. m. 10, Syrup. m. 30, every three hours.

Inhalations.—Pine, Creasote, Iodine (formulæ of B. P.)

,, Ipecacuanha Spray (F. 54*a*).

Climatic Treatment. — Bournemouth, Cannes, Gmunden, Hyères, Meran, Torquay, Isle of Wight.

Mineral Spa Inhalations.—Ems, Lippspringe.

BRONCHITIS (FIBRINOUS).

Emetics (F. 41, 42). Potass. Iod., Calumba (F. 5).

BRONCHIECTASIS.

Ol. Terebinth. m. xx.

CATARRH.

20 m. of Tinct. Opii or m. x. of Liq. Morph. Hydroch., and m. viii. of Vin. Antimon.

Taking no liquid for twenty-four hours may check incipient cold.

If running at eyes and nose has commenced, the inhalation of spirit of camphor or menthol, and Sulph. Quin. gr. x. given internally ; or Turkish bath.

In chronic sneezing, "Vapor Iodi," 120 drops in a pint of boiling water inhaled for five minutes night and morning.

Whey Cure.—Gais.

Mineral Spas.—Aix-les-Bains, Ems, Landeck, Baden in Austria, Neu-Ragoczy.

CHLOROSIS.

Blaud's pills in increasing doses daily (F. 89*a*).

Good food ; change of air.

Mineral Spas.—Schwalbach, Homburg (Luisen), Kissingen, Tunbridge Wells, Marienbad, Cannstadt.

CHOLERA.

Prophylactic, careful dietary, no fruit, sanitary precautions.

For prodromic diarrhœa, various astringent remedies. Basis of these should be Acid. Sulph. dil. Tinct. Opii (F. 16, 17, 18), or Castor Oil ʒi. et Tinct. Opii 10 drops.

If Cholera diarrhœa commenced, astringents useless. Essential Oils, Ether, Liq. Halleri (F. 18*a*), and Acid. Carbol., 2 gr. added to each dose.

If reaction begun—

Ice, aerated waters, brandy.

Morphine subcutaneously to allay cramps.

Turpentine stupes to abdomen.

Sinapisms to feet.

CHOREA.

In extreme cases, chloroform inhaled to allay fits, or solution of chloralamide ; artificial feeding.

Liq. Arsenicalis in increasing doses, with Decoct. Cinchon. (F. 4).

Liq. Arsenicalis with or without Iron.

Arsenic continued four to five weeks until constitutional symptoms of its action are seen.
Then Arsenic stopped, and replaced by liquid preparations of Iron (F. 81). Sulphate of Zinc—Antipyrin.
Or, Hypophosphite of Lime (F. 82).
Or other tonic preparations (F. 75, 76, 78).
Mineral Spas.—Bourboule-les-Bains, Mont-Dore (contain arsenic).

Colic, "Biliary."
Calomel and Jalap (F. 23).
Tinct. Podophylli 15 drops every second night.
Pil. Hydrarg. gr. 2, Ext. Colocynth. Co. gr. 1, Ext. Hyoscyam. gr. 1, followed by a Seidlitz Powder, or Sulph. Magnes. Mixture (F. 24).
Biliary Colic (with passage of gallstones)—Leeches to hepatic region. Sodii Bicarb. ℥i. in one pint of hot water—repeated. Liniment. Opii, Camph. et Chloroformi (F. 57*h*).

Lead Colic.
In ordinary cases—Sulph. Magnes. Mixture (F. 24).
In extreme cases—Ol. Croton. 1 to 2 m. on butter, followed, when bowels have acted, by Potass. Iod., small doses (F. 5).
If paralysis is present, constant current daily.
Mineral Spas.—Carlsbad, Homburg, Kissingen, Tarasp, Vichy, Marienbad, Cheltenham, Leamington, Scarborough.

Renal Colic.
Hot fomentations, administration of chloroform, morphine subcutaneously.
Ol. Junip., Sp. Aeth. Nit., Tinct. Digital. (F. 39).
Nitrate of Potassium, Barley Water (F. 40).
Mineral Spas.—Vichy, Tarasp, Carlsbad.

Congestion (Cerebral).
If acute—
Leeching behind ears; quick, strong purgatives—Ol. Crotonis 1 to 2 m. on butter; Calomel and Jalap (F. 23), followed by Potass. Bromid., Ext. Ergot. Liq. (F. 71*a*).
If following on mental strain—
Laxatives, light diet, white meat, chicken, etc. Liq. Arsenical. (F. 4).
Sea voyage. Complete rest.
If chronic, Hypophosphites (F. 82).

Congestion of Liver.
Leeches to hepatic region, followed by hot poultices.
Pil. Hydrarg., Ext. Coloc. Co., Ext. Hyoscyam. (F. 27*a*).

After pill, give Seidlitz Powder or Mist. Sulph. Magnes. (F. 24).
Tinct. Jalapæ, Syrup. Zingib., Decoct. Aloes Co. (F. 25).
Afterwards Tonics—Acid. Nitro-Mur. dil., Tinct. Gent. Co., Decoct. Tarax. (F. 79*a*).
Mineral Spas.—Carlsbad, Marienbad, Franzensbad, Homburg.
Careful dry diet, avoidance of wines and beer.
Mineral Spas.—Carlsbad, Kissingen, Homburg, Marienbad, Tarasp, Cheltenham, Leamington, Harrogate.

CONSTIPATION.

Brown bread; a vegetable rather than an animal diet; ripe fruit on an empty stomach; stewed figs or prunes after dinner. Carlsbad salts, Hunyadi Janos or Friedrichshall mineral waters before breakfast.
In chronic cases, for males, a pill after dinner of Ext. Aloes, Ext. Gent., Ext. Nucis Vomic. (F. 28*a*).
For females, Tamar Indien; Pulv. Rhei Co.; Pulv. Glycyrrhizæ Co.; Tinct. Jalapæ, Syrup. Zingib., Decoct. Aloes Co. (F. 25).
If with hæmorrhoids, Confect. Sulph., or Confect. Piperis.
In old people, Ext. Belladon. $\frac{1}{4}$ gr. gradually increased to 1 gr. daily.
New Remedies—
Extract. Cascaræ Sagradæ Liquidum ℥i.
Euonymin, 2 gr. in pill.
Suppositoria Glycerini.
Mineral Spas.—Kissingen, Tarasp, Homburg, Leamington, Cheltenham, Scarborough.

CONVULSIONS IN CHILDREN.

1. Lancing gums.
2. Caster Oil or Soap Enema.
3. Followed by warm bath.
4. After action of bowels, Potass. Bromid. gr. 2; Syrup Chloral m. x. in aq. ℥ss. every four hours.
5. Chlorobrom.

CONVULSIONS IN ADULTS (Uræmic).

Inhalation of Chloroform.
Chloral injections, 45 grs. to an adult (15 to a child).
Injection of Pilocarpine (F. 34*a*).
,, Digitalin, $\frac{1}{60}$ gr.

CONVULSIONS (Puerperal).

Chloral by Enema. Begin with 60 grains, and, if required, continue by 15-grain doses till an aggregate of 120 grains is reached.

Inhalation of Chloroform.
Venesection, question of (see p. 402).
If possible, hasten delivery by forceps.

CROUP.

If child strong and well fed, Leeches to Manubrium Sterni.
Emetics. Sulph. Cupri, 10 grs. in 2 ounces of water, a large teaspoonful every five minutes until vomiting is produced. Or Vin. Ipecac., a teaspoonful at same intervals.
Warm bath ; hot pack ; hot sponging ; tracheotomy.

CYSTITIS.

Belladonna, Buchu, Copaiba.
Wash out bladder with solution of Boracic Acid.

DELIRIUM TREMENS.

If first attack, patient young and strong, stop stimulants at once ; if patient weak, history of previous attack, withdraw them gradually, or substitute a diffusible stimulant, as Ammon. Carb.
Unless looseness of the bowels exists, stimulate the liver to action by Calomel, 5 grs., followed by Black Draught.
When bowels have acted, Tinct. Opii, 40 or 60 m., repeated every two or three hours until sleep is produced ; or with Vin. Antim. (F. 70), or in the Hypodermic Injection of Morphine.
Hydrate of Chloral, gr. 30 every two hours, alone or with Potass. Bromid. (F. 69). Feeding most important.

DIABETES MELLITUS.

Dietetic.—Flesh meat, fowls, fish, green vegetables, or green parts of vegetables. Diabetic biscuits, tea or coffee sweetened by Saccharine ; for thirst, Acid. Phosph. Dil.
Medicinal.—Codeine, Pilocarpine, Phosphates (F. 91*a*).
Mineral Spas.—Carlsbad, Vichy, Neuenahr, or Vals.

DIARRHŒA (Infantile).

Warm bath, temp. 100° F. for ½ hour, then Calomel and Pulv. Ipecac. Co. in a small dose, repeated if necessary ; after 24 hours Castor Oil with 2 m. of Tinct. Camph. Co. If child not weaned, breast milk ; if weaned, cow's milk with lime water ; raw meat grated down with sugar (Trousseau).
Sporadic Cholera of Adults.—Catechu and Chalk Mixture (F. 17) ; Brandy, Hazeline, Chlorodyne.
Diarrhœa of adults with griping pains, Calomel and Rhubarb.
,, with restlessness, furred tongue, Pulv. Antimon. gr. iii., Pulv. Ipecac. Co. gr. vi. ; after six hours Tinct. Opii in Mist. Amygdalæ.

DIPHTHERIA.

General treatment—

Tinct. Ferri Perchlor. m. xxx., Glycerini m. xx., every two hours.

Or Potass. Iod. gr. iii., Pot. Chlorat. gr. iv., aq. ℥ii. every two hours, or Hydrarg. Perchlor. (see p. 183).

Subcutaneous injection of Pilocarp. Nitras, or Jaborandi internally. Ipecacuan. and Sulphate of Zinc as emetics; or better, Apomorphine ($\frac{1}{12}$ gr.) hypodermically.

Local treatment—

Lactic Acid 1 part, Glycerine 50 parts, painted over the patches.

Or Argent. Nitrat. ℥i., aq. ℥i. (Jenner).

Throat-gargles—Acid. Carbolic. or Potass. Permang. 2 grs. to ℥i. of water.

Glycerinum Boracis.

Hot inhalations every quarter of an hour (Œrtel).

Acid. Lacticum ℥i., Aquæ Calcis ℥viii. To be sprayed over patches by ball spray apparatus.

Tracheotomy, question of (see text, p. 184).

Affirmative answer, if obstruction is not below place where incision should be made.

Diet—Milk; ice to suck; stimulants, if powers failing.

For Secondary Paralysis—

Liq. Strychninæ Hydrochloratis (F. 80); constant current.

Mineral Spas in Secondary Paralysis.—Wildbad, Baden-Baden, Bagnères-de-Bigorre, Gastein, Plombières, Bath, Woodhall.

DROPSY.

(*a*) Removal of fluid by Skin—

Guaiacum and Nitre (F. 33).
Pilocarpine injections (F. 34*a*).
Turkish baths.

(*b*) Removal of fluid by Kidneys—

Squill, Liq. Ammon. Acetat., Decoct. Scoparii (F. 35).
Mercury, Squill, Digitalis (F. 36).
Potass. Bitart., Buchu (F. 38).
Potass. Nitras, Decoct. Hordei (F. 40).
Trousseau's Wine (F. 40*a*).

(*c*) Removal of fluid by Intestines—

Elaterium, Colocynth, Hyoscyamus (F. 27).
Potass. Bitart.
Pil. Gambogiæ Co.

Mineral Spas, Cardiac Dropsy. — Brückenau, Pyrmont Schwalbach, St. Moritz, Sternberg.
,, *Hepatic Dropsy.* — Griesbach, Kissingen, Carlsbad, Tarasp, Homburg, Cheltenham, Leamington.
,, *Renal Dropsy.*—Fachingen, Leuk, Vichy.

DYSENTERY (Acute)

Pulv. Ipecac. 25 grs., Sodii Bicarb. 10 grs., Syrup. Aurantii ℥ss. Repeat in eight hours; if disease not checked, in four hours.

For two nights afterwards give 10 grs. of Pulv. Ipecac.; and then 8-gr. doses of the same powder for four days.

A little Castor Oil after this.

During first eight hours no liquid; but ice only to suck if thirst is great; saturated solution of Sulphate of Magnesium, p. 90.

Dietary—Milk, yolk of eggs, strong soup. If great exhaustion, stimulants.

DYSENTERY (Chronic).

Here ulceration of intestines, Pulv. Ipecac. may still be given, but not in such large doses.

Vegetable astringents — Tannin, Rhatany, Gallic Acid (F. 19).

Mist. Cretæ, Cinnamon, Opium, Pulv. Aromat. (F. 18).

Pil. Plumbi c. Opio, Oxide of Zinc.

Or, twice daily, Pulv. Ipecac. Co. gr. v.

Bland nutritious diet. Sea voyage.

Mineral Spas.—Tarasp, Marienbad, Carlsbad, Spa, Franzensbad, Rehburg.

DYSPEPSIA (Various symptoms—various remedies).

1. Want of appetite, with acidity—
   Ammon. Carb., Potass. Bicarb., Inf. Chiratæ (F. 10).
   Without acidity—
   Acid. Nitro-Mur. dil., Tinct. Gent. Co., Decoct. Tarax. (F. 79*a*).
   Or Quin. Sulph., Acid. Sulph. dil., Syrup. Aurant., Tinct. Aurant. (F. 75).
   Or Orexin. Hydrochlor. 7 grs. in water with meals.
   Mineral Spas.—St. Moritz, Tarasp.

2. Nausea and vomiting—
   Careful regulation of diet. Creasote, Sp. Chlor., Tinct. Camph. Co., Glycerine (F. 11*a*).
   Acid. Hydrocyanic. dil., Liq. Bismuthi, Sp. Chlor., Tinct. Card. Co., Aq. Camph. (F. 9).

3. Flatulence and belching—
   Carminatives, Tinct. Card. Co., Tinct. Zingib., Sp. Ammon. Aromat. (F. 13).
   If immediately after meals, Pepsine and Rhubarb (F. 91).
   If with rotten-egg flavour, Charcoal Biscuits. Creasote (F. 11).
   If with great acidity, Sp. Ammon. Aromat., Liq. Potass., Tinct. Rhei (F. 73).
   Mineral Spas.—Kissingen, Homburg, Leamington.

4. Pain, Heartburn—
   Liq. Bismuthi, Sp. Chloroformi (F. 9).
   Wyeth's Soda Mint Tablets.
   Magnesia, Soda (F. 11).

5. Cramp—
   Calomel and Jalap, followed by carminatives, as Cardamoms and Ammonia (F. 13).

WATER-BRASH (Pyrosis).

Simply as a symptom of ordinary Dyspepsia—
Pulv. Kino Co. xii. grs., followed by a watery purgative, as Hunyadi Janos or Friedrichshall.
As evidence of Sarcinæ—
20 to 60 grs. of Sulphite of Sodium.
Rules as to food and drink, see p. 303.

ECZEMA (see Skin Diseases).

EMPHYSEMA.

Warm climate.
Stramonium Cigarettes or Nitrate of Potassium Papers (F. 51).
For cough—
Emetic of Ipecacuanha. Injection of Apomorphine, gr. $\frac{1}{12}$.
Antispasmodics—
(*a*) Tinct. Lobel., Sp. Æther., Tinct. Conii, Mist. Ammoniaci (F. 12).
(*b*) Tinct. Card. Co., Sp. Ammon. Aromat., Acid. Hydrocyan. dil., Aq. Carui (F. 13).
$\frac{1}{12}$ gr. of Apomorphine injected.
Warm climate.
Climate and Health Resorts.—Montreux, Bournemouth, Lippspringe, Isle of Wight.

ENURESIS.

In children, from irritable bladder.
Tincture of Belladonna ; Copaiba ; Potass. Bromid.

EPILEPSY.

During fit—

Loosen necktie, and put the head in such a position that it will not be injured. Piece of wood or india-rubber placed between teeth.

If of syphilitic origin—

Potass. Iodid., Hydrarg. Perchlor. (F. 1).

Other cases—

Potass. Bromid. in combination with other bromides, and give large doses—60 to 120 grs. daily for twelve months.

Atropine gr. ii., Sp. Rect. ʒii. Begin with 1 m. of this solution daily, increasing to 20 m.

Argent. Nitras ¼ gr. pill thrice daily ; Zinci Acet. gr. ii.

Local applications to back of neck—

Cupping, setons. Blisters of doubtful utility.

ERYSIPELAS.

1. Purgative—Calomel and Jalap (F. 23).
2. Followed by Tinct. Ferri Perchlor., 30 to 40 m. every three hours.
3. When temperature lowered, 20 m. of Tinct. Ferri Perchlor. thrice daily.
4. Iron, Calumba, and Glycerine (F. 79).
5. Quinine ; Antipyrin ; Antifebrin.

Local applications—

Dusting on Flour.
Oxide of Zinc Powder and Starch.
Collodion and Castor Oil ; or
Painting whole surface with solution of Argent. Nitras.
Line of demarcation on leg, with solid Nitrate of Silver.
Or with Glycerine and Extract Belladonna, equal parts.
Or Ichthyol Ointment or injection of Carbolic Acid.

ERYTHEMA.

Simple—

Rest in bed ; Saline Aperients, as Magnes. Sulph. and Acid. Sulph. dil. (F. 24).

Nodosum—

Tonics—Quinine (F. 75), Cinchona (F. 4).
Soothing dusting powders—Oxide of Zinc, Starch.

Papular—

Cloths soaked in whisky and water.

Migratory variety—

Application of solid Nitrate of Silver.

EXOPHTHALMIC GOÎTRE.

Quinine 5 grs. daily, Iron (Pil. Ferri) 5 to 6 daily.
Painting between eyebrows and upper lid with Tinct. Iodi, and protecting eye from injury with wet compresses.
Constant current.
Diet—Milk and vegetables.
Mineral Spas.—Franzensbad, Pyrmont, Schwalbach.

FEBRICULA.

Saline purgative—Sulph. Magnes., Acid. Sulph. dil., Aq. Menth. Pip. (F. 24), or Seidlitz Powder.
Followed by—
Diaphoretic Mixture—Liq. Ammon. Acet., Sp. Æth. Nit. (F. 31), or Potass Nitras, Decoct. Hordei (F. 40).
Or, at an early stage—
Tinct. Aconiti 1 m. every five minutes until 30 m. taken.
Diet of slops—Milk, gruel, arrowroot. No animal food.
Convalescence aided by tonics, Quinine (F. 75), or Iron and Quinine (F. 78).

FEVER (Typhoid).

In early stages, a teaspoonful of Vin. Ipecac. may be given until vomiting is produced, if the patient is strong.
NO PURGATIVE.
Then treat and watch symptoms. Patient in bed.

1. EXCESSIVE DIARRHŒA. If stools EXCEED four per day; but not before—
Pil. Plumb. c̄. Opio, one after every motion.
Mist. Cretæ, Aq. Cinnamomi, Tinct. Opii (F. 18).
Pil. Acid. Carbol. 2 grs. coated with Keratine.
Pulv. Cretæ Aromat. c̄. Opio.
Catechu, Tinct. Opii, Mist. Cret. (F. 17).
Or enema of Starch and Laudanum (F. 22).
2. Hæmorrhage. Brandy, if exhaustion and weak pulse.
Ol. Terebinth. 10 to 15 m. every hour.
Acid. Gallic. x. grs. every four hours.
Hazeline, 25 minims after every motion.
Chlorodyne, use in the same way as Hazeline.
Subcutaneous injection of Ergotine, 10 min.

Note.—This injection specially useful if internal hæmorrhage is going on.

3. Delirium—
No physical restraint. Skilled nursing.
Potass. Bromid. (F. 70*a*), or with Chloral (F. 69).
Morphine suppository (rarely).
Exceptional treatment—

4. Cool bath of 98° daily, gradually reduced to 78° if temperature above 105° or 106°.
5. Antipyretics—
   Large doses of Quinine, 30 grs.
   Digitalis and Quinine, or Digitalis alone.
   Antipyrin, 30 grs. hourly for three hours.
6. Stimulants—question of administering them, p. 41.
7. Temperature of room 65° F. Thermometric indications of patient's temperature noted daily on chart.
8. Diet—
   Milk best at regulated intervals, two tablespoonfuls every hour or two hours.
   Total milk per day 5 to 6 pints.
   Iced water between these times.
   Milk occasionally supplemented by mucilaginous drinks, barley water, oatmeal gruel, strong meat soup.
9. Convalescence—great care in changing diet ; *no alteration till morning and evening temperatures have been normal for a week.*

   Then, weak soup, arrowroot, beef-tea.
   No solid food until ulcers are cicatrised. Evidenced by

   1. No pain on pressure in iliac region.
   2. Tongue clean.
   3. Temperature normal.

   Short drives before attempting walking exercise.
   Tonics, Quinine (F. 75, 76).

FEVER (Typhus).

Emetic at first—Vin. Ipecac., one teaspoonful until vomiting is produced.
Then purgative—30 to 60 grs. of Pulv. Rhei Co.
Tepid water injections relieve after-constipation during fever.
Head shaved. Cooling lotions applied.
Skilled nursing. Temperature of room 65° F.
Diet—Milk every two hours, 5 to 6 pints daily, and weak soups about mid-day and early morning.
Stimulants, question of (p. 41).
Prevention of complications—

1. Bed-Sores—
   Avoid pressure at buttocks. Water-bed.
   Wash threatened parts with alum, white of egg, and brandy, or apply glycerine after washing carefully.
   If, through INATTENTION, bed-sores have formed—Charcoal poultice.
   Sore dusted with Iodoform Powder.

2. Pulmonary complications—
   Poultices of linseed meal to chest.
   Vin. Ipecac., Syrup. Tolu, Mucil. Acaciæ (F. 45).
   Followed by Ammon. Carb. gr. v. every three hours in milk (p. 42).
3. Bedclothes washed. Bed-pan always used.

FEVER (Relapsing).

Rest in bed, strong soups, milk, ice water charged with Carbonic Acid.
Cold application or continuous hot poultices to spleen.
10 m. of Acid. Phosph. dil. in sweetened water every two hours.
If symptoms of collapse, Brandy and Carbonate of Ammonium.
If delirium, Chloral, 15 grs. every hour until ʒii. taken, or Potass. Bromid. with Chloral (F. 69), or Potass. Bromid. alone (F. 70*a*).
Convalescence—Good diet, Wine, Quinine, and Iron (F. 76 and 78).

GALLSTONES (see Biliary Colic, p. 580).

To prevent formation.
   Resin Podophyll. gr. ¼, Pil. Hydrarg. gr. ii., Pil. Colocynth. et Hyoscyam. gr. i.
   Ether Sulph. m. 20 to 30, yolk of egg, Ol. Terebinth. m. 5 to 6, two or three times daily, until pain in side relieved, and exercise can be taken with impunity.
Mineral Spas.—Carlsbad, Marienbad, Tarasp, Franzensbad.

GOUT.

1. Brisk purgative—Calomel gr. ii., Ext. Coloc. Co. gr. iss. Calomel and Jalap (F. 23).
2. Then, when bowels freely moved—
   Vin. Colch., Magnes., Magnes. Sulph., Aq. Cinnamom. A draught (F. 68*a*).
   Tinct. Colch. Sem. ʒiss., Magnes. Carb. ʒii., Aq. ʒvi. (F. 68). One tablespoonful thrice daily.
3. General rules as to administration of Colchicum, p. 131.
4. Locally, perfect rest, and the application of a poultice sprinkled with Opium and Belladonna.
   When inflammation has subsided, bandage and slight friction.
5. Diet during acute stage—
   Milk, Arrowroot, Tea.
6. When fever abates—
   Beef-tea, Chicken Soup, plenty of Lithia water.

Chronic gout.

Mineral Spas. — Leamington, Cheltenham, Bath, Vichy, Homburg, Carlsbad, Tarasp, Teplitz, Wildbad, Wildungen, Harrogate.

New Treatment. — Dr. Mortimer Granville's Iodine treatment, or 68*c*.

GRAVEL.

(*a*) When urates predominate, Vichy or Carlsbad water, and Alkalies.

(*b*) When Phosphates, Nitro-muriatic Acid and generous diet.

(*c*) When Oxalates, plenty of cold water and no sugar.

During passage of calculus—

Barley water, Sp. Æth. Nitrosi.

Hypodermic injection of Morph. Acetas.

Warm poultices sprinkled with opium to the back.

Question of chloroform, p. 410.

Mineral Spas.—Rohitsch, Sauerbrun, Roisdorf, Contrexéville, Vichy.

HÆMORRHAGE (Cerebral).

See Apoplexy.

HÆMORRHAGE from Stomach (Hæmatemesis).

Gallic acid, 10 gr. every four hours (F. 19).

Ice to be sucked.

If hæmorrhage is very profuse, inject m. x. of Injectio Ergotini Hypodermica.

HÆMORRHAGE from Lungs (Hæmoptysis).

Acid. Sulph. dil., Tinct. Opii (F. 16).

Gallic Acid (F. 19); or

Injectio Ergotini Hypodermica, 10 m.

Hazeline, m. xxx. every two hours.

HÆMORRHAGE from Nose (Epistaxis), Nasal Douches.

(*a*) With solution of Alum, Tannic Acid, or Hamamelis.

(*b*) Internally, Digitalis, Ergot, Gallic acid.

HÆMORRHAGE from Kidneys.

Ice to back.

Pil. Plumb. c̄. Opio, one every three hours.

Infus. Maticæ ℥i. thrice daily.

Ol. Terebinth. m. ii. to m. iii., Mist. Amygdalæ ℥ss. every three hours with caution. Stopped if pain or retention of urine ensues.

Tinct. Cannab. Ind. m. 20, Mucil. Acaciæ, ℥i., aq. ad ℥i. every 6 hours.

HEADACHE (with Plethora).

Calomel 4 grs. in the evening, followed by Mist. Sennæ Co. ℥i. in the morning, or Mercury, Podophyllin, Colocynth, Hyoscyamus in pill (F. 27*a*).

If due to indigestion, Pulv. Rhei Co. gr. 60.

Hemicrania (Megrim)—Cit. Caffeinæ gr. 5; Sodii Salicylas gr. 30 in strong coffee; Nitrite of Sodium 2 parts in 120 of water—a teaspoonful twice daily; Antipyrin gr. 15 twice daily.

General Treatment.—Change of air, sea-voyage, avoidance of worry.

HEADACHES (Symptomatic).

Dependent on uterine diseases or catamenial irregularities. Treat by appropriate remedies, according as the headache comes under one or other of the three varieties mentioned.

Potass. Bromid. gr. xx., thrice daily in latter cases.

Hot bath, if catamenial period expected.

Mineral Spas.—Franzensbad, Ems, Schwalbach.

HEADACHES (due to Syphilis).

Potass. Iodid. and Hydrarg. Perchlor. (F. 1).

Donovan's Solution.

Mineral Spas.—Aix-la-Chapelle, Neuenahr, Harrogate.

HEART DISEASE (Valvular).

Cardiac Tonics—Digitalis Group—

If mitral disease, Digitalis at once (F. 89).

If aortic with good compensation, attention to diet, avoidance of excitement, regulation of the bowels.

If aortic with failing compensation, Digitalis (F. 89), with occasional doses of Tincture of Rhubarb.

Tincture of Strophanthus m. 3 at first, increased to m. 10 thrice daily; Citrate of Caffeine gr. 5; Liq. Ext. Convallaria m. 8-10; Casca bark (Tinctura Erythrophlœi m. 5-10).

If dropsy, Calomel gr. ½ thrice daily; Pilocarpine (F. 34*a*).

Diet—Nitrogenous and albuminous fluid, no alcohol, tea or coffee weak.

Mineral Spas.—Homburg, Kissingen, Soden.

Climatic Resort.—Davos Platz for mountain exercise, recommended by Œrtel.

HICCOUGH.

Sucking Ice; Champagne; Charcoal Biscuits.

Spirit. Æth. 20 m., Tinct. Card. Co. ℥ss., Aq. ℥ss.; draught.

Inject. Morph. Hypoderm. 5 m. = ½ gr. of Acet. Morph.

Inject. Nitratis Pilocarpin., ¼ gr. in x. m. of water.

Chloral. Hydratis, Potassii Bromidi, Potassii Bicarb. āā ℥i., Liq. Morph. Acetat. ℥i., Aq. ad ℥vi. Two tablespoonfuls every three hours.

If chronic—

Tinct. Physostigmatis (U.S.P.) m. x., Potass. Carb. gr. x., Mucilag. Acaciæ ℥i. M.—One dose thrice daily.

One teaspoonful of mustard infused in half-pint of boiling water, the infusion filtered, and draught given to patient.

HOOPING-COUGH.

Direct inhalation of a spray containing Carbolic Acid gr. 4, Glycerine m. 6, Sodii Carb. gr. 10, Water ℥i. ; isolation ; proper regulation of temperature ; Belladonna in increasing doses ; Fuller's Cure (F. 15*a*) ; Nitric Acid, Dr. Gibb's Cure (F. 15); Antipyrin; Emetics at fixed hour daily; Vin. Ipecac. or Apomorphine ; Niemeyer's Coercive Cure ; outdoor treatment (p. 187) ; locally, Roche's Embrocation.

HYSTERIA.

Charcot's Moral Treatment—

Removal from home surroundings and sympathy ; massage. Weir Mitchell dietary, p. 530.

During a paroxysm the inhalation of Chloroform, or cold water dashed over patient.

If hyperæsthesia—

Potass. Brom. (F. 70*a*), or with Chloral Hydras (F. 69).

If loss of sensation—

Constant current daily over affected part.

If vomiting—

Liq. Bismuthi and Acid. Hydrocyan. dil. (F. 9).

If paralysis—

Constant current ; Strychnine (F. 80). Hypophosphites (F. 82, 82*a*).

In many cases of hysteria—

Tinct. Valerian., Tinct. Asafœt., Tinct. Lavand. Co. useful (F. 14).

If Catamenial irregularities are the cause—

Potass. Bromid. gr. xx., Sp. Ammon. Aromat. m. x., Aq. ℥i. S. et M.

Taken twice daily.

Mineral Spas.—Franzensbad (mud baths), Lippik, Wildbad, Teplitz, Lucca, Bath.

INCONTINENCE OF URINE IN CHILDREN FROM IRRITABILITY OF BLADDER.

Tincture of Belladonna ; Copaiba ; Potass. Bromid.

INFLUENZA.

Rest in bed until convalescence is assured.

Medicinal Treatment.—Symptomatic.

If rheumatic symptoms—
Salicylate of Sodium 25 grs. every 3 hours until diaphoresis established.
If fever—
Liq. Ammon. Acet., Sp. Æth. Nit. (F. 31).
If chest symptoms—
Ipecacuanha; Linseed meal poultices; Inhalations of steam or inhalations of Ichthyol, 2 per cent.
If stomach derangements—
Liq. Bismuth. and Acid. Hydrocyan. Dil. (F. 9).
In any form of attack, Quinine 2 to 3 grs. at 12 and 4 o'clock in half a glass of sherry.

JAUNDICE (Dependent on Gallstones).
See Hepatic Colic.

JAUNDICE—
A slighter form not due to obstruction—
Mercurial preparations (F. 8 and 23).
Podophyllin (F. 27*a*); Taraxacum; Ipecacuanha.
Saline Draughts (F. 24) and Seidlitz Powder.
General dietetic treatment either alone or combined with Acid. Nitro-Muriat. dil. (F. 79*a*) or Strychnine (F. 85).
Mineral Spas.—Carlsbad, Kissingen, Vichy.

LARYNGISMUS STRIDULUS—
Potass. Bromid. with Chloral Hydrate (F. 69); Chloroform Inhalations; Hot bath during paroxysms (p. 198).

LARYNGITIS (Acute).
Leeches to larynx of adults—to manubrium sterni of infants.
Hot water compresses to throat.
Diaphoretics, Liq. Ammon. Acetat., Sp. Æth. Nitrosi (F. 31).
Inhalations of Ol. Pini Sylvest. or Creasot. (F. 53, 54).
Question of tracheotomy, p. 190.

LARYNGITIS (Chronic).
Rely upon inhalations of Acid. Carbolic., Ol. Pini Sylvest. (F. 53*a*, 54).
Chloride of Zinc 30 grs., Aq. ℥i., or Tannin and Glycerine may be applied locally.
Errors of diet and hygiene corrected.
Rest, dry climate, respirator.
Mineral Spas.—Carlsbad, Ems, Marienbad, St. Andreasberg.

LEAD COLIC.
Constipation in early stage—
Sulph. Magnes. (F. 24). If this fails, Ol. Croton, ♏. i.-ii. on butter.
Hot fomentations to abdomen to relieve pain.

To remove lead from system—
Potass. Iodid. (F. 5)—small doses.
For paralysis—
Constant current daily.

LOCOMOTOR ATAXY (Tabes Dorsalis).

In early stages—
Well-regulated hydropathy, cold baths.
Spine rubbed with hot cloths at 70° to 80° F., gradually lowered to 50° F.
Sea voyage advisable.
Mineral Spas.—Bath, Baden-Baden, Franzensbad, Gastein, Pfeffers, Teplitz, Wildungen, Wildbad.
In advanced cases—
Argent. Nitras, ¼ gr. doses in the form of pill, with bread, until 120 grs. are taken.
Potass. Bromid. to relieve fidgety sensation (F. 70*a*).
Suspension method (see p. 479).
In far-advanced cases—
Attention to symptoms.

MEASLES.

For children—Confectio Sennæ.
For young persons (F. 25)—Tinct. Jalapæ, Syr. Zingib., Decoct. Aloes Co.
To bring out the eruption, the old remedy, Tinct. Croci, is recommended in 10 m. doses every two hours.
In catarrhal stage—Diaphoretics—Liq. Ammon. Acetat., Sp. Æth. Nitrosi (F. 31).
For cough—Vin. Ipecac., Liquor. Ammon. Citrat., Tinct. Camph. Co. (F. 34).
Should bronchitis ensue, the remedies recommended under that head should be referred to.
Diet—As a rule, milk.
When low typhoid state exists, wine is specially necessary, with strong soup, and Ammon. Carb. gr. iii. every two hours.
Room darkened to relieve the photophobia if catarrhal ophthalmia is present.

MENINGITIS (Acute).

Head shaved, ice applied, light excluded from room.
Active purgatives—Calomel and Jalap (F. 23), or Croton Oil, 1 m. to 2 m. Mercury until salivation is imminent.
If mercury not given, then Potass. Bromid. in large doses (F. 70*a*).
Food should be solely liquid—Beef-tea, strong soup. If swallowing objected to, use beef-tea enemata.

MERCURIAL SALIVATION.

If coppery taste, spongy gums, bad breath—
Tinct. Myrrh., Alum., Inf. Rosæ Acid., as a gargle (F. 48).
Borax and Glycerine (F. 50).
Potass. Iodid. in small and repeated doses (F. 5), preceded by Potass. Chloras for two days (F. 7).
For mercurial palsy—removal from exposure to fumes, and Potass. Iodid. (F. 5).

NEURALGIA.

(*a*) Facial—Quin. Sulph. 5 grs., suspended in milk administered before expected attack ; or (F. 75) Quin. Sulph. in acid solution. Antipyrin ; Gelsemium.
Citrate of Caffein Efferves. 60 grs.
Liq. Arsenicalis (F. 4).
Butyl-Chloral Hydrate, 5-gr. doses.
Locally—
Hypodermic injection of Morphine ; Ungt. Veratrinæ.
Or Ungt. Aconitinæ, Camphor and Chloral equal parts.
Cocaine, Menthol.
Mineral Spas.—Altwasser, Bonnes, Eaux-Chaudes, Ischl, Schwalbach.

(*b*) SCIATICA.

Local injection of Morphine ; small blisters following course of the nerve.
Unguentum Aconitinæ or Veratrinæ, hot and cold douches, induced current, Turkish baths, massage.
Large doses of Iod. Potass. 15 to 120 grs. daily.
Confect. Terebinth., teaspoonful dose ; Strychnine (F. 80).
Last resort—Stretching of nerve.
Mineral Spas.—Buxton, Bath, Ischl, Teplitz, Wildbad.

OBESITY.

Meat diet ; no fatty or starchy food ; no sweet wines ; little liquid at meals.
Œrtel's systematic exercise on gradually increasing gradients.
Other Methods.—Frequent draughts of hot water two hours after food.
Medicinal Treatment.—Iodides or Alkalies ; Liq. Ext. of Fucus Vesiculosus ℥i.-℥ii.
Mineral Spas.—Marienbad, Carlsbad, Kissingen, Homburg.

PARALYSIS.

(*a*) General Paralysis of Insane—Treatment only palliative.
(*b*) Hemiplegia—At first, complete rest. Three weeks after attack—Phosphorus and Strychnine (F. 80, 85, 86). Constant current. Daily friction over paralysed muscles, with flexion and extension of the same.

(*c*) Paraplegia—If evidence of congestion, Ergot and Bellad. (F. 71*a*, 15*a*). If of malnutrition, Strychnine and Phosphorus (F. 80, 85).

(*d*) Bell's Paralysis — Persistent use of constant current. Strychnine (F. 80). If syphilitic, Potass. Iodid. and Hydrarg. Perchlor. (F. 1).

(*e*) Writer's Cramp—Rest if possible. In writing use pencil or soft quill pen, so that any violent grasp becomes impossible. Massage. Induced and weak galvanic current.

(*f*) Infantile Paralysis — Ergot, Fluid Extract, 10 drops thrice daily in early stages. Constant current and local friction. If the stage of atrophy is reached, *no* Ergot, but Strychnine may be tried (F. 80).

In various forms of paralysis, not far advanced—

Mineral Spas.—Baden-Baden, Bath, Bagnères-de-Bigorre, Gastein, Johannisberg, Oeyenhausen, Plombières, Teplitz, Wildbad, Woodhall.

PERICARDITIS.

Large blisters chiefly relied on, covering whole cardiac surface.

Ice-bag, if local pain severe (1 to 3 hours at a time).

Digitalis in small doses if heart's action rapid.

Subcutaneous injection of Morph. Acetas if great pain.

For Insomnia, Chloralamide in doses of gr. xxx.

Depression met by Wine, Brandy, Quinine.

If effusion has resulted — Pil. Hydrarg., Digitalis, Scillæ (F. 36).

Last resource—Paracentesis—situation fifth intercostal space to the left of the sternum; avoid wounding internal mammary artery.

Repeated punctures better than withdrawal of all the fluid at once.

Other treatment, in young and vigorous subjects, is twenty or thirty leeches, followed by a Saline Aperient.

Application of a warm poultice.

Hydrarg. Subchlor. gr. ss., Pulv. Antimonialis gr. i.
One such powder every hour, until slight salivation is produced.

PHTHISIS.

Cod-Liver Oil (Ol. Morrhuæ Emulsio, F. 65*d*).

Calcis Hypophosphis c. Glycerino (F. 82).

,, ,, et Syrupus (F. 82*a*).

Koch's Treatment, see p. 142; Liebrich's, see p. 143.

Inhalations—Ol. Lupuli et Ol. Pini Sylvest. (F. 52, 54). Creasoti vapor (F. 53). Vapor Iodi.

Hæmorrhage—Inject. Ergotini Hypodermica, 10 to 12 drops. Acid. Sulph. dil., Tinct. Opii (F. 116).

Night sweats—Atropine $\frac{1}{100}$ gr., by hypodermic injection at night.

Diarrhœa—Hazeline, 30 drops every three hours. Chlorodyne, 25 drops after every motion. Mist. Cretæ (F. 17, 18).

Counter-Irritants—Lin. Croton., Lin. Iodi, over affected part of lung.

Diet—Cod-Liver Oil most useful, cream comes next. Alcohol, as rum, with milk in the morning.

Sydenham's exercise on horseback.

Change of Climate. *Warm Climates*—Meran, Pau, Hyères, Nice, Cannes, Pisa.

High Altitudes.—Davos-Platz, Denver, Colorado Springs, Maloja. Sea Voyages.

Grape cure—Meran, Vevey.

PHTHISIS (Acute).

Iced cloths to abdomen.

Sulph. Quininæ, large doses.

Niemeyer's Pill—Quin. Sulph. 1 gr., Pulv. Opii et Pulv. Digital. āā $\frac{1}{4}$ gr. Fiat Pil. One thrice daily.

Nourishing diet; stimulants at stated intervals.

PLEURISY (Acute).

Early friction stage—leeches, hot poultices or fomentations.

Tinct. Aconiti 1 m. every half-hour for twenty-four hours; afterwards—

Tolu, Ammoniacum, and Opium (F. 43).

Controlling movements of sides by sticking plaster.

For absorption of effusion—

Pil. Hydrarg., Scillæ et Digitalis (F. 36) until salivation commenced, then Potass. Iodid. (F. 5).

Small blisters, Unguent. Iodi.

Diet—Nourishing, with wine.

Paracentesis, if effusion purulent.

,, serous (see p. 240).

Daily compression of the sound side has lately been recommended, as it throws the work upon the diseased lung and so favours absorption.

PLEURISY (Chronic).

If absorbents fail, paracentesis.

Risk of position of puncture.

Quantity to be taken (see p. 241).

Health Resorts.—Colorado Springs, Davos-Platz, Meran, Montreux, Wiesen.

PNEUMONIA (Acute Lobar).

Early stage, that of Crepitation—I recommend the following:—

12 leeches, followed by fomentations.

Vin. Antimon. ℥ss., Sp. Chloroform. ℥iii., Aq. Camph. ad ℥vi. M.

A tablespoonful every two hours for twenty-four to forty-eight hours; when temperature lowered, same mixture every four hours for two days.

Then—Ammon. Carb. and Quinine (F. 76).

Quinine (F. 75).

In second stage, that of resolution, my plan is:—

Not to use Antimony, but tonic treatment from first.

Other forms of treatment—

Cold applications to chest, either by ice-bags or evaporating lotions.

Large doses of Quinine, gr. x. to gr. xv., with ¼ gr. of Morph. Hydrochlor. once or twice repeated during twenty-four hours.

Then, after twenty-four hours, Quinine in 5-gr. doses every four hours without Morphine.

Antipyrin, gr. x. to xv., antifebrin, gr. v. to xv.

Tinct. Aconiti, 1 m. every hour for twenty-four hours in early crepitation stage.

Ol. Terebinth. et Ammon. Carb. et Inf. Serpent.

In convalescence with great expectoration—

Inf. Senegæ.

Local applications.—Linseed meal poultices; ice.

PNEUMONIA, CATARRHAL, of Young or Aged.

Uniform moist atmosphere of 60° to 70° F. Baths 77° to 86° F., followed by cold affusion if fever high.

Ipecacuanha, Tolu, and Acacia (F. 45), or Ammonia, Squills, and Senega (F. 44).

PURPURA (Simplex).

Acid. Sulph. dil. m. x. with ½ gr. Quin. Sulph. every two hours.

Good diet, with wine.

PURPURA (Hæmorrhagica).

Tinct. Ferri Perchlor. (F. 78).

If Internal Hæmorrhage, Ol. Terebinth. or Creasote (F. 11*a*).

Horizontal position.

RHEUMATISM (Acute).

1. Salicylate of Sodium (physiologically pure), 20 grs. every two hours; or Salicin, 25 grs. every two hours.

2. After forty-eight hours the salt or salicin should be given in the same doses every four hours for two days, and then every six hours for three days.
3. Then 10 grs. thrice daily for a day or two. Afterwards Tonics (F. 87).

Diet—At first milk, at stated intervals, then chicken soup. Convalescence aided by fish and white meat, with three or four ounces of claret daily.

RHEUMATISM (Chronic).

Potass. Iod., Inf. Calumbæ (F. 5). Guaiacum Mixture (F. 6). Turkish baths.

In Lumbago and Pleurodynia.—Lin. Chloroform., Belladonna (F. 57*h*), followed by warm fomentations. If urine scanty, full doses of Citrate of Potassium at short intervals.

Mineral Spas.—Droitwich, Woodhall, Aix-la-Chapelle, Aix-les-Bains, Teplitz, Wiesbaden. Residence during winter in a warm climate.

RHEUMATISM (Chronic, with exudation, etc.) round joints.

Thermal Spas.—Bath, Baden-Baden, Teplitz, Wiesbaden, Wildbad.

Cold Sulphur Spas.—Strathpeffer, Moffat, Harrogate, Woodhall, or Buxton; temp. 80° F.

RICKETS.

Lime Water ʒi. in milk several times in the day.

Syr. Ferri Phosph., Cod-liver Oil, Hypophosphite of Lime.

SCARLET FEVER.

1. Febrifuge Mixture (F. 31).
2. Alterative Powder (F. 8).
3. Tinct. Aconiti, if inflammation great, 1 m. dose.
4. Chlorate of Potassium drink (60 grs. in a pint of water) *ad libitum.*
5. Potass. Chloras, with Glycerine.
6. Ammon. Carbon., in late stages.
7. Antipyretics; when fever high — Quinine (F. 75), or Antipyrin.
8. Fat or oil as an inunction.

Secondary Nephritis following Fever.

Application of Leeches. Poultices. Tinct. Aconiti (F. 75). Diuretics—Potass. Bitart. (F. 39), preceded by quickly acting purgative (F. 23).

Diet—Milk, beef-tea, soup.

Convalescence—Scale preparation of iron.

Clothing—Flannel during desquamation.

SKIN, DISEASES OF.

ACUTE ECZEMA.—*Local Treatment.* In *early stage* of papular or vesicular form, pure starch flour.

If *exudation profuse*, Hebra's diachylon ointment.

When desquamation occurs, zinc ointment.

CHRONIC ECZEMA.—*Local Treatment*—

1. *Crust removed* by warm poultices or compresses of distilled water.
2. *Moist surface* healed by diachylon or zinc ointment, Liq. Plumbi Diacetatis.
3. *To remove hyperæmia*, Pic. Liquid. i., Spirit. i., then Naphthol or Chrysarobin ointment.

Constitutional Treatment.—Salines, with careful regulation of diets. Arsenic only given when no inflammatory symptoms exist.

Mineral Spas.—Schlangenbad, Wildungen, Lippspringe, Bath, Harrogate.

PSORIASIS.—*Local Treatment.* Chrysarobin ointment, or tar, or pyrogallic acid, 5-10 per cent solution. Preference given in most cases to the Chrysarobin treatment and Liq. Arsenicalis in increasing doses. When recovery is progressing, gradually diminish the dose of the liquor.

Alcohol in any form forbidden.

Diet such as not to cause acidity. Contrexéville or Vichy water.

Mineral Spas.—EARTHY—Royat, Wildungen. ARSENICAL—Bagnères-de-Bigorre, Mont Dore. SULPHUR—Harrogate, Moffat, Strathpeffer.

URTICARIA—To *relieve itching*, Water with Vinegar, Aromatic Spirit or Spirit of Wine, or ointments as Sulph. Sublim. ℥i., Ol. Cadini ℥ii., Unguent Zinc. ℥i.

Internally.—Quin. Hydrobrom. gr. v. every four hours, or pill containing Liq. Sulph. Atrop. and Gentian, see p. 550.

SCABIES.—*For adults*, Ung. Sulph. (F. 60*b*) for three nights. *For children*, Ung. Storax (F. 60*c*).

In other skin diseases, Arsenic, Alkalies, Potass. Iod., Iron, Quinine, Cod-liver Oil, Hydrarg. Perchlor.; various lotions (F. 55*a*, 57, 57*a*); ointments (F. 59, 59*a*, 61, 64*b*, 65*b*).

Mineral Spas.—Baden, Bourboule-les-Bains, Contrexéville, Kreuznach, La Bourboule, Mont Dore, Royat, Soden, Harrogate, Strathpeffer, Woodhall.

SLEEPLESSNESS.

Exercise; attention to bowels; cold bath.

Position in bed.—Head high, warmth to stomach, warmth to feet. Attention to these things lessens the cerebral circulation, and this anæmia of the brain is an essential condition in producing sleep.

Hypnotics.—Preference given to a solution of Chloralamide and Bromide of Potassium, 30 grs. of each (Chlorobrom).

SMALL-POX.

Early incubation stage (papular)—Saline aperient (F. 24), Diaphoretics (F. 31).

During pustular stages, Salicylic Acid (F. 6*b*), Sod. Bicarb. or Ammon. Carb. (F. 44).

At a later period in the pustular stage—Ferri et Ammon. Cit. (F. 90).

Local Applications, Prick Pustules on Face.

Apply Acid. Carbol. and Glycerine (F. 56*a*).

Or Acid. Carbolic., Glycerine, Gelatine, and water (F. 6*c*).

Warm alkaline baths.

In Secondary Stage.

Bromide of Potassium and Hydrate of Chloral (F. 69).

Beef-tea and nourishing diet.

Gloves worn to prevent scratching.

STOMACH (Ulcer of).

Bismuth. Subnit. gr. v., Sod. Bicarb. gr. iv., Pulv. Opii, gr. $\frac{1}{4}$, twice daily.

Liq. Bismuthi, Acid. Hydrocyan. dil., in mixture (F. 9). Mist. Creasoti.

Carlsbad salts in early morning—to correct acidity, dislodge gases, and act as a gentle aperient. Dose ℥i.

Most reliance placed on complete rest to the stomach, the strength being sustained by nutrient enemata (see text).

SYPHILIS.

1. Inunction of Unguent. Hydrarg. every night.
2. Hypodermic injection of Perchloride of Mercury.
   Mode of preparation, see p. 99.
3. Gluten-Peptone Sublimate injection, see p. 100.
4. Fumigation, 8 to 10 grs. of Calomel sublimed by heat, deposited on skin of patient.
5. Internal administration of Hydrarg. c. Cret., ii. to iii. grs. twice daily.

   Pil. Hydrarg. Subchlor. Co. (Plummer's Pill) twice daily.

   Perchloride of Mercury combined with Potass. Iodid. (F. 1).

   ,, ,, in the form of Pill with Ext. Gentianæ (F. 2).

   Zittmann's Decoction (F. 8*b*).

Mineral Spas.—Aix-la-Chapelle, Aix-les-Bains, Neuenahr, Kreuznach, Vals, Cheltenham, Harrogate.

VOMITING.

Liq. Bismuthi, Acid. Hydrocyan. dil. (F. 9).
Creasote, Tinct. Camph. Co., Sp. Chloroform. (F. 11*a*).
Creasote 1 m., and Pulv. Opii gr. ¼ as a pill.
Occasional doses of Hydrarg. c. Cretâ.
Carbolic Acid in pill ; Blister over epigastrium ; Morphine hypodermically ; Cocaine ; oxide of Zinc.

Sea-Sickness—
Iced Champagne, Mist. Potass. Bromid. (F. 70*a*).
Nitrite of Amyl Capsules.
Tight bandage round abdomen.
Horizontal position at first, afterwards steady exercise.

Vomiting of Pregnancy—
Vini Ipecac. in 1 m. dose, with ʒi. of water, hourly.
Oxalate of Cerium, 2 grs.
Pulsatillæ Tinct., 5 to 30 m.
Iced Water ; Ingluvin.

Mineral Spas.—Homburg (Ludwig), Vichy.

WORMS.

Tapeworms.
Inf. Cusso, Ol. Terebinth.
Ext. Filicis Liq. on an empty stomach (F. 29).

Followed by full meal of mashed potatoes in the morning.
Detection of parasite's head is the only certain test of its death.

Lumbrici (*Round Worms*).

Santonin.—grs. ii. to iii., or (F. 30).
Ol. Terebinth. m. x., repeated.

Thread Worms.

For children—
Enemata of cold water, Inf. Quassiæ, or cold tea.
Occasional doses of Hydrarg. c. Cret.
Active cathartic, Calomel and Jalap or (F. 30 or F. 30*a*).

For adults—
Tinct. Ferri Perchlor. ʒss. to 1 pint of water as an enema.

BATHS

Cold Bath, to reduce temperature—

1. Cold affusion. The patient is placed in a bath and four or five gallons of cold water thrown over him.

2. The patient is placed in a bath about 90° F., and the temperature is gradually reduced to 80°, 70°, or 60° F. The patient is kept in the bath for about twenty minutes. Alluded to in continued fever (p. 51).

3. Cold bath at once at a temperature of 60° to 90°. Ice may be put into this bath and the temperature reduced to 45° if the patient's temperature is very high, as in some cases of pneumonia, cerebral rheumatism, and pericarditis. Alluded to under rheumatism (p. 125).

Cold Sponging.—This is employed in cases when the previously-named baths might be dangerous. The loss of heat is due partly to the application of the cold water, and partly to the evaporation which takes place from the surface of the body. It may be employed in diseases where the temperature is 104° or 105° F., as in typhoid fever.

Mud Baths.—These baths are prescribed in cases of hyperæsthesia, sleeplessness, and female disorders. Various Continental spas have the mud for these baths conveyed from divers places, but undoubtedly the natural home for the best mud baths is at Franzensbad. This spa is situated on a "peat moss"; and portions of this moss are worked up into a soft poultice consistence and at a temperature of 98·5° F.; the patient undressed sits in this conglomerated mass for ten or fifteen minutes. The sensations imparted are those of great rest and physical repose, with a tendency to sleep after emerging from the bath and being sponged with lukewarm water. They are generally ordered to be taken on alternate days.

Turkish Baths.—These baths are employed in chronic rheumatism, sciatica, lumbago, and Bright's disease. The bath consists usually of three rooms, one for undressing and for resting in after the bath is finished; a second at a moderate temperature of 130° to 140° F.; and a third or hot room, where the temperature may reach 180° or even 200° F. The patient is recommended to sit or lie on a couch in the second room for half an hour until perspiration is freely established, sipping cold water if necessary to allay thirst. He may, after the expiry of the time mentioned, try the hot room for fifteen minutes; but this should never be done if there is any tendency to cerebral congestion, if perspiration is not thoroughly established, and if a sensation of giddiness is experienced. After

leaving the hot room the patient should proceed at once—not delaying in the second room—to the shampooing room, where an experienced rubber should knead individual muscles, and stretch arms, legs, and small joints firmly, yet without causing any pain, which is never to be desiderated. Afterwards the shampooer should lather him with soap, and allow the hot-spray bath to play on him for a minute or two, gradually bringing on first tepid and then cold spray. A swim through a cold pond completes the bathing process in most well-regulated Turkish bath establishments; coming from the pond he should be enveloped in a warm sheet and rest in the dressing-room until he feels perfectly cool, and then he should leisurely dress. If the Turkish bath is taken in winter a cup of coffee or tea should be drunk before going into the open air, and it is better to walk home than to be driven.

Vapour Baths or Russian Baths are not recommended for invalids. Some persons in good health seem to enjoy them, but they are inferior both in utility and comfort to Turkish baths. Calomel fumigation is referred to at p. 100.

Acid Bath.—An acid bath is prepared by mixing eight ounces of nitro-hydrochloric acid with a gallon of water at 98° F. Flannel is soaked in this, then wrung out thoroughly, and applied as a compress to the liver. It should then be covered with oil-silk, and may be allowed to remain on for some hours, or even a day. This acid compress is recommended in enlargement of the liver, especially in cases in which this is caused by residence in a tropical climate.

Alkaline Bath.—This is prepared by adding sixty grains of crystallised carbonate of sodium to each gallon of water. It is useful in chronic skin diseases.

Conium Bath.—This bath is prepared by adding to a full-length bath of tepid water at 98° F., three handfuls of conium leaves. In chronic skin affections, attended with great itching, as eczema or prurigo, it is singularly valuable. The patient should rest in it for about twenty minutes, the bath being covered with a sheet and waterproof, and the head free. In this way there is no danger of the narcotic vapour affecting the cerebral circulation, or the central nervous system.

Sulphurous Baths.—Artificial sulphurous baths are prepared by dissolving sulphurated potash in water—half a drachm to the gallon. Such baths have been recommended in psoriasis and chronic rheumatism. They are, however, much inferior to the natural sulphur baths obtained at Aix-la-Chapelle, Aix-les-Bains, and Neuenahr, the benefit from which in constitutional syphilis and chronic rheumatism is very great.

Pine Bath.—At various Continental spas of a muriated saline character, as Homburg, Kissingen, or Marienbad, pine baths are in common use. To the water of these spas heated in a bath about eight ounces of decoction of pine are added. This gives the bath a pleasant perfume, and the sensation to the skin of the bather is delightful. They are recommended in chronic gout, chronic rheumatism, and hyperæsthesia.

Mustard Bath.—The mustard bath requires about sixty grains of mustard to be added to a gallon of water. A foot-bath or a full bath of this is recommended in some cases to bring out the eruption in exanthemata. In neither case should the bath be continued longer than ten minutes.

PRESCRIPTIONS, TABLES, ETC.

EVERY qualified practitioner, on being called to a patient, may be required, in addition to dietetic rules, to embody his ideas of medicinal treatment in the form of a prescription. This prescription is written out in Latin, a language which should be familiar to every educated man. It is the masonic badge of our profession, and he who is ignorant of it, or uses it wrongly, is an interloper in the practice of medicine, although he may have received his degree from a university or licensing board.

In ancient times every prescription or formula had at its commencement certain characters, abbreviations, and sentences of a superstitious or pious character, such as

+—The sign of the cross.
α and ω—Alpha and Omega, the beginning and the end.
C. D.—Cum Deo.
J. D.—Juvante Deo.
L. D.—Laus Deo.
N. D.—Nomine Dei.
J. J.—Juvante Jesu.

These constituted the invocation. Ancient authors also used the sign  being the old heathen invocation to Jupiter, seeking his blessing upon the formula, equivalent to the usual invocation of the poets and Mahomedan authors, or the *Laus Deo* with which bookkeepers and merchants' clerks formerly began their books of accounts and invoices, a practice now almost extinct. "It is at present so disguised by the addition of the down stroke, which converts it into the letter R, that were it not for

its cloven foot, we might be led to question the fact of its superstitious origin" (Paris, *Pharmacologia*). Without doubting this origin, we may say that at the present time, in beginning a prescription with ℞, we understand by it the abbreviated form of recipe, the second person singular, imperative mood, of the verb recipio, -i, -eptum, -ĕre. Recipe, as a part of an active transitive verb, governs the accusative case; hence the quantity of the drug to be weighed is placed in the accusative.

If in grains	=granum,	gen. -i,	acc. pl.	grana.
,, minims	=minimum,	gen. -i,	,,	minima.
,, drachms	=drachma,	gen. -æ,	,,	drachmas.
,, ounces	=uncia,	gen. -æ,	,,	uncias.

The drugs prescribed, being governed by the quantity of medicine ordered, are placed in the genitive case. Thus—

Extractum Colocynthidis Compositum	=Extracti Colocynthidis Compositi.
Pilula Hydrargyri	=Pilulæ Hydrargyri.
Magnesii Sulphas	=Magnesii Sulphatis.
Vinum Ipecacuanhæ	=Vini Ipecacuanhæ.
Tinctura Camphoræ Composita	=TincturæCamphoræCompositæ.

Each drug ordered should have a separate line, and to this recipe is understood, the quantity being in the accusative case, and the name of the drug in the genitive.

At the end of the prescription *misce* is placed, being the second person singular, imperative mood, of misceo, -ui, -stum or -xtum, -ēre; or, if a solution is wanted, *solve* may be employed, being the second person singular, imperative mood, of solvo, -vi, -utum, -ĕre.

The directions to the patient should be preceded by *signa*, mark thou; or *signetur*, let it be marked.

The initials of the prescriber are appended to the prescription.

An unabbreviated prescription for an expectorant mixture will now be given with its basis, adjuvans, corrigens, and vehiculum.

Recipe—Ammonii Carbonatis drachmam (Basis).
Tincturæ Scillæ drachmas tres (Adjuvans).
Tincturæ Zingiberis drachmas tres (Corrigens).
Infusi Senegæ ad uncias sex (Vehiculum). Misce.
Signa—A tablespoonful every four hours.

With reference to directions, which should be written in English, there should be no dubiety, and all strong medicines used externally should be labelled POISON, or for EXTERNAL USE.

Wealthy patients, as a rule, have graduated measure glasses, with which they apportion their doses; middle-class or poor patients generally use familiar domestic articles. Thus—

A teaspoonful	is equal to	1	fluid drachm.
A dessertspoonful	,,	2	,, drachms.
A tablespoonful	,,	4	,, drachms.
Two tablespoonfuls	are equal to	8	,, drachms or 1 ounce.
A wineglassful	is equal to	1½ or 2	fluid ounces.
A teacupful	,,	5	,,
A breakfastcupful	,,	8	,,
A tumblerful	,,	10 or 12	,,

These are only approximately equal, most spoons being large, some much larger, than here indicated.

If a medicine is ordered three times a day, it is understood that the nurse will give it at certain hours —the usual time being, if it is ordered "three times a day," 11 A.M., 3 P.M., 7 P.M., unless special directions to the contrary be given in the prescription, or by verbal message from the physician in attendance. "Bedtime" means 10 or 11 P.M., if the patient is bedridden, the latter hour being understood if the patient is able to go about. If the directions are every three or four hours, it is not intended, except under special circumstances, that the patient, if asleep, should be roused to take the medicine. Medicines being ordered to be taken before meals, it is inferred by this that half an hour or twenty minutes should intervene; if after a meal, the same lapse of time is understood. Pills and powders are, probably to those unaccustomed to their use, most easily taken covered by jam or jelly. Pills are easily taken by placing them well

back on the tongue, bending the head *forward*, and then swallowing saliva, or a little water. Sometimes the pills or powders may be placed in rice-paper moistened, and a bolus being thus made, the latter is swallowed somewhat like an uncooked oyster.

APOTHECARIES' TABLES

WEIGHT

20 grains (gr.)	= 1 scruple, ℈i.
3 scruples	= 1 drachm, ʒi.
8 drachms	= 1 ounce, ℥i.
12 ounces	= 1 pound, lb.

					1	sc. ℈i.	=	20 grs.
			1	dr. ʒi.	=	3 ,,	=	60 ,,
		1	oz. ℥i.	=	8	,,	=	24 ,,	=	480 ,,
1	lb.	=	12	,,	=	96	,,	=	288	,,	=	5760 ,,

MEASURE

60 minims (♏)	= 1 fluid drachm, f. ʒi.
8 fluid drachms	= 1 fluid ounce, f. ℥i.
20 fluid ounces	= 1 pint, Oi.
8 pints	= 1 gallon, C (congius).

| | | | | | | | |

tres, tres, tria; or indeclinable, as decem, viginti, triginta, quadraginta, sexaginta.

Semis expresses the half, and the symbol is ss.; occurring alone after a symbol of quantity, it is translated *dimidius, -a, -um, e.g.* ʒss. = drachmam dimidiam or semi-drachmam; along with another (entire) number, it is translated *cum semisse, e.g.* ʒiss. = drachmam cum semisse. āā (ana) means "of each the same quantity"; thus—

℞ Potassii Bromidi
Ammonii Bromidi āā drachmam.

The official dose for medicines is intended for adults, and in prescribing for children or young persons the dose must be proportionate to the age. The proportion is calculated from the following rule—divide the age (in years) by the age *plus* 12. The resulting fraction of the adult dose is suitable for the case in question.

Thus for a child of two years it will be $\frac{2}{2+12} = \frac{2}{14} = \frac{1}{7}$, making the dose $\frac{1}{7}$th of that of an adult.

If for a child of three years, $\frac{3}{3+12} = \frac{3}{15}$ths, or $\frac{1}{5}$th, etc.

Opium and its preparations act powerfully on children, and hence the dose must be reduced to a greater extent.[1] In prescribing mixtures for children the dose should seldom or never exceed a teaspoonful.

The directions should be such as to suit the requirements of each individual case; thus in a mixture for diarrhœa it is usual to direct that a dose be given "after each liquid stool"; for paroxysmal cough, a dose "when the cough is troublesome," etc.

The Pharmacopœia lays down definite doses for the official groups of preparations of drugs, as in decoctions, infusions, extracts, liquors, powders, and wines, and for the convenience of prescribers a synopsis of the doses of these in common use will now be given.

[1] As a rule, opium should not be prescribed to children.

POSOLOGICAL TABLES

DECOCTA (DECOCTIONS)

The ordinary dose of Decoctions is from 1 to 2 oz. The exceptions are—

Decoctum—	Dose.		Dose.
Aloes Compositum	½ to 2 oz.	Sarsæ	2 to 10 oz.
Cetrariæ	1 to 4 ,,	,, Compositum	2 to 10 ,,
Granati Radicis	2 to 4 ,,	Scoparii	2 to 4 ,,
Hordei	1 to 4 ,,	Taraxaci	2 to 4 ,,

EMETICS

	Dose.
Zinci Sulphas	10 to 30 grs. in water.
Vinum Ipecacuanhæ . . .	3 to 6 fl. drms.
Cupri Sulphas	5 to 10 grs. in water.
Sinapis	1 to 4 drms. in water.
Injectio Apomorphinæ Hypodermica	2 to 8 m.

EXTRACTA (EXTRACTS)

Small Doses

Extractum—	Dose.		Dose.
Aconiti	¼ to 1 gr.	Gelsemii Alcoholicum	½ to 2 grs.
Belladonnæ	¼ to 1 ,,	Nucis Vomicæ	½ to 2 grs.
,, Alcoholicum	1/16 to ¼ ,,	Opii	½ to 2 grs.
Cannabis Indicæ	¼ to 1 ,,	Physostigmatis	1/16 to ¼ gr.
Colchici	½ to 2 grs.	Stramonii	¼ to ½ ,,
,, Aceticum	½ to 2 ,,		
Aloes Barbadensis	2 to 6 ,,	Aloes Socotrinæ	2 to 6 grs.

Large Doses

Extractum—	Dose.		Dose.
Anthemidis	2 to 10 grs.	Jalapæ	5 to 15 grs.
Calumbæ	2 to 10 ,,	Krameriæ	5 to 20 ,,
Cascaræ Sagradæ	2 to 8 ,,	Lactucæ	5 to 15 ,,
Colocynthidis Compositum	3 to 10 ,,	Lupuli	5 to 15 ,,
Conii	2 to 6 ,,	Papaveris	2 to 5 ,,
Gentianæ	2 to 10 ,,	Pareiræ	10 to 30 ,,
Glycyrrhizæ	5 gr. to ʒi.	Quassiæ	3 to 5 ,,
Hyoscyami	5 to 10 grs.	Rhamni Frangulæ	15 to 60 ,,
Hæmatoxyli	10 to 30 ,,	Rhei	5 to 15 ,,
Jaborandi	2 to 10 ,,	Taraxaci	5 to 30 ,,

Liquid Extracts

Extractum—	Dose.		Dose.
Belæ Liquidum	1 to 2 drms.	Glycyrrhizæ Liq.	1 drm.
CascaræSagradæLiq.	½ to 2 ,,	Opii ,,	10 to 40 m.
Cimicifugæ ,,	3 to 30 m.	Pareiræ ,,	½ to 2 drms.
Cinchonæ ,,	5 to 10 m.	Rhamni ,,	1 to 4 ,,
Cocæ ,,	½ to 2 drms.	Sarsæ ,,	2 to 4 ,,
Ergotæ ,,	10 to 30 m.	Taraxaci ,,	¼ to 2 ,,
[1] Filicis ,,	60 to 80 ,,		

INFUSA (Infusions)

The ordinary dose of Infusions is from 1 to 2 oz. The exceptions are—

	Dose.		Dose.
Infusum Anthemidis	1 to 4 oz.	Infusum Maticæ	1 to 4 oz.
,, Buchu	1 to 4 ,,	,, Cusso	4 to 8 ,,
,, Digitalis	¼ to ½ ,,	,, Caryophylli	1 to 4 ,,

INJECTIONES HYPODERMICÆ

	Dose.
Injectio Apomorphinæ Hypodermica, 2 grs. in 100 m.	—2 to 8 m.
,, Ergotini Hypodermica, about 1 gr. in 3 m.	—3 to 10 m.
,, Morphinæ Hypodermica, 1 gr. in 10 m.	—1 to 5 m.

LIQUORES (Liquors)

	Dose.
Liquor Arsenicalis	2 to 8 minims.
,, Arsenici Hydrochloricus	2 to 8 ,,
,, Sodii Arseniatis	5 to 10 ,,
,, Arsenii et Hydrargyri Iodidi	10 to 30 ,,
,, Morphinæ Acetatis	10 to 60 ,,
,, ,, Hydrochloratis	10 to 60 ,,
,, ,, Bimeconatis	5 to 40 ,,
,, Strychninæ Hydrochloratis	4 to 10 ,,
,, Hydrargyri Perchloridi	30 to 120 ,,
,, Bismuthi et Ammonii Citratis	30 to 60 ,,
,, Ferri Dialysatus	10 to 30 ,,
,, ,, Perchloridi	10 to 30 ,,

MISTURÆ (Mixtures)

The official Misturæ Ammoniaci, Amygdalæ, Creasoti, Cretæ, Ferri Aromatica, Ferri Composita, Guaiaci, Scammonii, Sennæ Composita, Spiritus Vini Gallici, are prescribed in doses varying from 1 to 2 oz.

OLEA (Oils)

The oils principally used are the special fixed oils—

Oleum Ricini— Dose, 1 to 8 drms.
,, Crotonis— ,, ⅓ to 1 m.

[1] The B. P. dose of this extract, 15-30 m., is too small.

Special Volatile oils—	Dose.
Oleum Copaibæ	5 to 20 m.
,, Cubebæ	5 to 20 ,,
,, Eucalypti	1 to 4 m., and as an inhalation.
,, Juniperi	1 to 3 m.
,, Pini Sylvestris	As an inhalation only.
,, Santali	10 to 30 m.
,, Sinapis	Externally.
,, Terebinthinæ	10 to 30 m.
,, ,,	(as an anthelmintic) 2 to 4 drms.

PULVERES (POWDERS)

Pulvis—	Dose.
Antimonialis	3 to 5 grs.
Catechu Compositus	20 to 40 ,,
Cinnamomi Compositus	3 to 10 ,,
Cretæ Aromaticus	10 to 60 ,,
,, ,, cum Opio	10 to 40 ,,
Elaterini Co.	½ to 5 ,,
Glycyrrhizæ Compositus	30 to 60 ,,
Ipecacuanhæ Compositus	5 to 15 ,,
Jalapæ Compositus	20 to 60 ,,
Kino Compositus	5 to 20 ,,
Opii Compositus	2 to 5 ,,
Rhei Co.	20 to 60 ,,
Scammonii Compositus	10 to 20 ,,
Tragacanthæ Compositus	20 to 60 ,,

TINCTURÆ (TINCTURES)

The usual dose of Tinctures is from ½ to 2 drms. Those with smaller doses are—

Tinctura—	Dose.		Dose.
Aconiti	5 to 15 m.	Iodi	5 to 20 m.
Belladonnæ	5 to 20 ,,	Jaborandi	30 to 60 ,,
Camphoræ Co.	15 to 60 ,,	Lobeliæ	10 to 30 ,,
Cannabis Indicæ	5 to 20 ,,	,, Ætherea	10 to 30 ,,
Cantharidis	5 to 20 ,,	Nucis Vomicæ	10 to 20 ,,
Capsici	10 to 20 ,,	Opii	5 to 40 ,,
Chloroformi Composita	20 to 60 ,,	,, Ammoniata	30 to 60 ,,
Chloroformi et Morphinæ	5 to 10 ,,	Podophylli	15 to 60 ,,
Cimicifugæ	15 to 60 ,,	Sabinæ	20 to 60 ,,
Colchici Seminum	10 to 30 ,,	Scillæ	10 to 30 ,,
Conii	20 to 60 ,,	Stramonii	10 to 30 ,,
Digitalis	10 to 30 ,,	Sumbul	10 to 30 ,,
Ergotæ	5 to 30 ,,	Tolutana	20 to 40 ,,
Ferri Acetatis	5 to 30 ,,	Valerianæ Ammoniata	30 to 60 ,,
,, Perchloridi	10 to 30 ,,	Veratri Viridis	5 to 20 ,,
Gelsemii	5 to 20 ,,	Zingiberis	15 to 60 ,,
Hyoscyami	30 to 60 ,,	,, Fortior	5 to 20 ,,

VINA (WINES)

Vinum—	Dose.	Ipecacuanhæ	Dose.
Aloes	1 to 2 drms.	(Expectorant)	5 to 40 m.
Antimoniale	5 to 60 m.	,, (Emetic)	2 to 6 drms.
Colchici	10 to 30 ,,	Opii	10 to 40 m.
Ferri	1 to 4 drms.	Quininæ	½ to 1 oz.
,, Citratis	1 to 4 drms.	Rhei	1 to 2 drms.

The most important additions made to the British Pharmacopœia of 1885 are—

Antifebrin, dose 3 to 10 grs. Antipyrin, dose 3 to 20 grs.

Extractum Euonymi Siccum, dose 1 to 4 grs.

Liquor Cocainæ Hydrochloratis, dose 2 to 10 m. Liquor Trinitrini, *Syn.* Solution of Nitro-glycerine, dose ½ to 2 m.

Paraldehydum, dose ½ to 1½ fl. dr. Phenacetinum, dose 5 to 10 grs.

Pilula Ferri (Blaud's Pill). For directions as to dose, see under Chlorosis, p. 158.

Sulphonal, dose 15 to 40 grs. Suppositoria Glycerini.

Tinctura Strophanthi, dose 2 to 10 m. Tinctura Hamamelidis, dose 5 to 60 m. Tinctura Hydrastis, dose 20 m. to ʒi.

In writing out a prescription the prescriber should proceed on certain broad intelligible principles. He should first of all consider in what form he will order a medicine, and in doing this he must consult the patient's taste or idiosyncrasy, for some patients are averse to taking pills or powders and prefer mixtures, which, in many instances, from their inherent bitterness, require to be made sweet. Sweetness in most cases may be accomplished by adding to a mixture glycerine or syrup, or a solution of saccharine—℞ Saccharini gr. v., sodii carbonatis gr. iii., sp. rect. m. xv., aquæ m. cxxvii. M.—1 gr. in 30 m.

With reference to correcting the bitterness of certain tinctures and other medicines, we have found by a series of trials that this will be effected by the saccharine solution in the following proportions:—Quassia, calumba, chiretta, cinchona, and cinchon. co., 15 m. of these tinctures will be disguised by 20 to 30 m. of the solution; cascarilla, gentian, gentian co., 15 m. of these by 5 to 10 m.; quinine and nux vomica, 15 m. by 40 to 60 m., but the result in comparison with others is not so satisfactory; sodii salicylas, 15 grs. by ʒiss., or salicin or salicylic acid, 15 grs. by ʒii.

60 m. of the solution effectually take away the excessive bitterness of an equal proportion of the liquid extract of cascara sagrada.[1]

It would simplify the writing of prescriptions and render them much more accurate if each prescriber ordered one dose of a medicine. Thus in powders, where it is desirable to give an alterative for a child of five years he would naturally fix on a combination of hydrargyrum c. cretâ, sodii carbonas, and pulvis rhei. As—℞ Hyd. c. cretâ gr. ii., sodii bicarb. gr. ii., pulv. rhei gr. iii. M.—Make six such powders. S.—One as directed.

In an alterative and aperient pill for an adult, where it is desirable to prescribe mercury with colocynth and hyoscyamus, he should write—℞ Pil. hydrarg. gr. iii., ext. colocynthidis co. gr. i., ext. hyoscyami gr. i. M.—Make six such pills. S.—One as directed.

In prescribing a mixture the same plan should be followed. The prescriber says within his own mind—I shall order arsenic with tincture of cardamoms, and infusion of quassia, as—℞ Liq. arsenicalis m. v., tinct. card. co. ℥ss., inf. quassiæ ℥ss. As a mixture containing a tonic requires to be taken oftener than a pill or powder, it is necessary to order a larger quantity of the official doses of the drugs mentioned. So in writing out a prescription for a six-ounce mixture, it is necessary to multiply the doses by twelve, the number of half-ounce or tablespoonful doses in a six-ounce mixture, as—℞ Liq. arsenicalis ℥i., tinct. card. co. ℥vi., inf. quassiæ ad ℥vi. M. S.—One tablespoonful thrice daily after food.

The mental arithmetic—such a bugbear to beginners—is thus minimised, and prescription writing in time becomes easy and accurate. Based, however, on no distinct plan, it is apt to become slipshod and careless. It is also to be remembered that the success of the practitioner in daily practice is meted to him, not by his knowledge of "ologies," but by his acquaintance with disease and the remedies he can use.

[1] Mr. L. R. Sutherland, my class assistant, conducted these experiments with saccharine under my superintendence.

Some errors creep into prescriptions from haste, carelessness, or ignorance, and we shall allude to a few of these. Thus distilled water is spelt with an *i* in English, but with an *e* in Latin. Yet a very common error is to write *aquæ distillatæ* at the end of a prescription instead of *aquæ destillatæ*. It is bad Latin, if say one drachm is ordered, to place the accusative singular of unus, and to write drachmam unam, for the unam is better left understood. When two drachms are ordered, the accusative of duo must be given, which is duas if agreeing with drachmas, and duo if agreeing with grana.

In the last line of a prescription the error of writing *aquam* instead of *aquæ* may be pardoned in a student, but this inelegant Latin, occurring in a text-book of medicine or materia medica, has to be judged by a different standard. If the rendering of prescriptions be correctly interpreted, *aquam* grates on the ear like a false note of music. The other quantities are given in the genitive, and to make a harmonious and accurate whole *aquæ* is proper Latin, while *aquam* is not. Old writers never erred in this respect.[1]

Another common mistake is to write "spiriti" as the genitive of "spiritus": this is a noun of the fourth declension, and its genitive is thus "spiritūs." Some nouns are declined irregularly: thus the genitive of calomel is "calomelanos" (nom. "calomelas").

We shall now refer to and point out errors in prescriptions containing well-known drugs :—

Strychnine.—Strychnine is often employed as a tonic in cases of nervous debility, or in recovery from acute disease. It is made up in the form of liquor, as "liquor strychninæ hydrochloratis," in the last Pharmacopœia, thus indicating that it is dissolved in an acid, the acid being dilute hydrochloric acid. The dose is 4 to 10 minims = $\frac{1}{25}$ to $\frac{1}{10}$ grain of strychnine. In former Pharmacopœias it was simply termed "liquor strychniæ," and perhaps on

[1] This question was referred to three professors of Latin in different universities, who all stated that *aquæ* was correct.

account of this prescriptions have been ignorantly written where the liquor was combined with an alkali—℞ Liq. strychniæ ℥ii., potass. bicarb. ℥ss., aq. ad ℥iv. M. This is manifestly wrong, and so also is the combination of liq. arsenicalis with liq. strychniæ—℞ Liq. arsenicalis ℥ii., liq. strychniæ ℥ii., aq. ad ℥i. M. S.—10 drops twice daily after food. When dispensed, this is a seemly mixture, but a reaction occurs, the alkaline carbonate in liq. arsenicalis neutralising the hydrochloric acid in liq. strychn. hydrochlor., and consequently the alkaloid falls to the bottom in fine crystals, especially if the mixture is exposed to cold. An over-dose of such a powerful drug as strychnine is a serious matter, and the following mixture, if taken as written, would undoubtedly have caused symptoms of poisoning:—℞ Acidi sulphurici diluti ℥ii., liquoris strychniæ ℥ss., aquæ ad ℥ii. M. S.—A teaspoonful in water as directed. When the prescriber's attention was directed to this he substituted the liquor he intended—viz. extractum ergotæ liquidum, the maximum dose of which is 60 minims. Although liquor strychn. hydrochlor. has no synonym, and liquor arsenicalis has, the following jumbled-up prescription has come under my notice:—℞ Liquor. strychniæ (Fowler's solution) ℥i., tinct. ferri perchloridi ℥ii., aquæ ad ℥vi. M.—A teaspoonful thrice daily.

Tincture of Digitalis and Iron Preparations.—Tincture of digitalis is frequently prescribed with the tincture of perchloride of iron—*e.g.* ℞ Tinct. digitalis ℥ii., tinct. ferri perchlor. ℥ii., aq. ad ℥vi. M. S.—A tablespoonful thrice daily. Dispensed as by the formula, a muddy mixture results, in no sense however, as experience shows, untherapeutical, though somewhat unseemly. If, however, the water is added to the tinct. digitalis, and afterwards the tinct. of the perchloride, this unseemliness does not occur, and the mixture has no deposit. Since liq. ferri dialysatus has become pharmacopœial, errors have arisen in attempting to unite it with tinct. digitalis, thus:—℞ Tinct. digitalis, liq. ferri dialysati

āā ℥ss. M. S.—20 drops thrice daily. On mixing the above there is an immediate separation of highly basic ferric oxychloride and ferric hydrate, which causes the whole mixture to assume the condition of a solid jelly.

An attempt to combine chlorate of potassium with liq. ferri dialysatus and syrup of lemon has lately come under my observation, *e.g.*—℞ Potass. chlorat. ℥ii., liq. ferri dialysati ℥ii., syr. limonis ℥ss., aquæ ad ℥vi. M. A brown deposit results, showing its inutility so far as iron is concerned; liq. ferri dialysatus is best prescribed with glycerine.

Bismuth and Alkaline Preparations.—The subnitrate of bismuth is an excellent stomachic, sedative, and astringent, and it is sometimes ordered with sodium and potassium bicarbonate, as—℞ Sodii vel potassii bicarb. bismuthi subnitrat. āā ℥ii., mucil. tragacanthæ ℥iii., aquæ ad ℥vi. M. S.—Half a tablespoonful twice daily. A reaction here occurs between the bicarbonate and subnitrate of bismuth, carbonic acid being at the same time given off. The action is not immediate but occurs slowly, so that awkward results may follow from bursting of the bottle, especially if the patient has to make a journey and places the bottle among his clothes. Any untoward result here may be avoided by using hot water in dispensing, when immediate completion of the reaction occurs ; or better still, bismuthi carbonas may be prescribed instead of bismuthi subnitras. ℞ Liquor. bismuthi ℥i., tinct. kino ℥iv., mist. cretæ ad ℥iv. M.—A dessertspoonful thrice daily. The liq. bismuthi and tinct. kino combined form an unsightly clotted mass ; a better result is obtained by adding the liq. bismuthi last. Some misconception exists with regard to the suspension of bismuth. Mucilage of acacia has been employed, and answers fairly well if the mixture—say for diarrhœa of children—is given in small bottles and used in the course of twenty-four hours ; if kept long the bismuth settles down and cannot be properly suspended by shaking. Mucilage of tragacanth contains now in the British Pharmacopœia rectified spirit, and suspends the bismuth for

any length of time. The same suspension is also produced when pulvis tragacanthæ compositus is employed, carefully mixing the powders together in a mortar with a pestle, then adding water or other vehicle, and transferring the mixture to a bottle.

Perchloride of Mercury, Iodide of Potassium, and Infusion of Cinchona.—℞ Liq. hydrarg. perchlor. ℥ii., potassii iodidi ℥i., inf. cinchonæ ad ℥vi. M. S.—Half an ounce thrice daily. The mixture of perchloride of mercury and iodide of potassium produces potassio-mercuric iodide, or "Mayer's reagent" for the detection of alkaloids, and, when added to the infusion of cinchona, causes a complete precipitation of all the cinchona alkaloids in the form of double iodides of mercury and the alkaloids. Infusion of quassia, which contains no alkaloid, may be prescribed, but *no infusion containing any alkaloid is admissible.*

Perchloride of Mercury and Liquor Strychninæ.—℞ Liq. hydrarg. perchlor. ℥ii., liq. strychninæ hydrochlor. ℥iss., aquæ ad ℥ii. M. S.—One teaspoonful thrice daily. This mixture is open to the same objection as the preceding, all the strychnine being precipitated as double chloride, having the formula $(C_{21}H_{22}N_2O_2HCl)_2HgCl_2$.

Perchloride of Mercury and Tincture of Calumba.—℞ Liq. hydrarg. perchloridi ℥iii., tinct. calumbæ ad ℥ii. M. S.—One teaspoonful in water after meals. This mixture slowly lets fall a yellow precipitate of double chloride of mercury and berberine.

Iron Preparations.—It is well known that the liquid preparations of iron can only be prescribed with three infusions—quassia, calumba, and chiretta. When other infusions are used a black or muddy mixture ensues. Even in the case of chiretta, a deposit soon falls, but this in no way interferes with the action of the drug. In all cases, however, such a mixture should be prescribed in such quantity as only to last a few days; or quassia may be substituted in place of chiretta, as the latter possesses

no specific properties. The tincture of the perchloride of iron, from its excellent tonic qualities, naturally suggests its being prescribed with iodide of potassium, which salt, valuable as an alterative, has also a tendency to cause weakness and loss of strength, thus :—℞ Tinct. ferri perchlor. ʒss., potassii iodidi ʒii., decoct. sarsæ co. ad. ʒviii. M. S.—A tablespoonful thrice daily after food. The potassium iodide reduces the ferric chloride to ferrous chloride, with the formation of potassic chloride and free iodine according to the following equation :—

$$Fe_2Cl_6 + 2KI = 2FeCl_2 + 2KCl + I_2.$$

℞ Tinct. ferri perchloridi ʒss., acid. phosph. dil. ʒvi., infus. quassiæ ad ʒvi. M. S.—A dessertspoonful three times daily. Made up according to this prescription there is a precipitate of ferric phosphate. But the mixture may be rendered elegant and useful by redissolving the precipitate with the addition of a little hydrochloric acid.

Alkaline Preparations.—In some forms of dyspepsia with acidity, it may be deemed advisable to prescribe the bicarbonate of sodium with a bitter infusion, thus :—℞ Sodii bicarb. ʒii., infus. cinchonæ ad ʒvi. M. S.—To be taken as directed. According to the old Pharmacopœia this is a perfectly good prescription, as no acid was employed, but the new Pharmacopœia directs for infusion of cinchona the red cinchona bark to be made up with aromatic sulphuric acid, and hence the acid and the alkali form an incompatible mixture. The alkali may, however, be prescribed with decoctum cinchonæ, in which there is no acid.

It may be considered advisable to prescribe quinine with bicarbonate of potassium, as—℞ Potass. bicarb. ʒii., quininæ sulph. ʒss., acid. sulph. dil. q.s., aquæ ad ʒvi. M. S.—A tablespoonful thrice daily.

Here it is impossible to add acid to dissolve the quinine, and at the same time to have an alkali in the mixture. The difficulty may, however, be solved by

rubbing the potass. bicarb. and quin. sulph. together, and adding the water gradually. In this way a presentable creamy mixture results.

Another incompatible alkaline mixture is the combination of potassium (or sodium) bicarbonate with magnesium sulphate; the former being by constitution an acid salt, the following reaction slowly occurs—

$$2KHCO_3 + MgSO_4 = MgCO_3 + K_2SO_4 + H_2O + CO_2.$$

Again, the physician should be careful not to prescribe the *carbonate* of potassium or sodium when he intends the *bicarbonate* to be given; carbonate of potassium (salt of tartar) and carbonate of sodium (washing soda) have an irritant and even caustic action on the mucous membrane of the alimentary tract, and are unsuitable for internal administration.

Iodide of Potassium.—A common error is to prescribe iodide of potassium with sp. ætheris nitrosi. The sp. ætheris nitrosi always contains free nitrous acid, which instantly liberates free iodine with production of nitric oxide gas, thus:—℞ Potassii iodidi ℥i., sp. ætheris nitrosi ℥ss., aquæ ad ℥vi. M. S.—A tablespoonful every three hours. The mixture can be obtained perfectly correct if sufficient bicarbonate of potassium is added to neutralise the spiritus ætheris nitrosi previous to combining it with the iodide of potassium. Potassium iodide in solution soon becomes partially decomposed with the liberation of free iodine, thus mixtures containing it should be calculated to last only for a few days at most.

Permanganate of Potassium.—Permanganate of potassium may be prescribed in a pilular form with kaolin ointment, or it may be given in the two-grain lozenges of Wyeth of Philadelphia. It cannot be prescribed with syrup or glycerine, or any other oxidisable substance, as —℞ Potassii permangan. gr. ii., syrupi q.s. M.—Make a pill; one such thrice daily. Similarly also oxide of silver cannot be prescribed with creasote, for deflagra-

tion takes place. If creasote is previously mixed up with curd soap this will be avoided, but the two drugs should not, without this precaution, be prescribed together.

Argenti nitras is frequently prescribed with crumb of bread, as — ℞ Argenti nitratis gr. ii., micæ panis q.s. Divide into twelve pills. 170 of nitrate of silver are decomposed by 58·5 of chloride of sodium, and this reaction occurs in the pill mass mentioned. The nitrate is ultimately turned into chloride when it reaches the stomach, but then it is in a nascent state. Wheaten flour or fine siftings may be prescribed with silver in a pilular form, or, according to Squire, kaolin ointment. Oxide of silver should also be prescribed in pill with kaolin ointment: vegetable extracts reduce it with deflagration, especially if much friction be used.

Phosphorus and Cod-Liver Oil.—The advantage of combining cod-liver oil with phosphorous preparations is great in tubercular or scrofulous conditions. A dangerous combination occurs when phosphorated oil is prescribed directly with ol. morrhuæ, as—℞ Ol. phosphorati ♏cxliv., ol. morrhuæ ad ℥xxiv. M. S.—A tablespoonful three times a day. Phosphorus is here liable to separate, and poisoning may ensue. The danger is aggravated when phosphorus is put into the oil in small pieces and left to dissolve; this it does not do, but remains undissolved. Cod-liver oil should be acted on by ether, as oil of almonds is, before adding the phosphorus.

Cough Mixtures.—A common error in cough mixtures is to prescribe carbonate of ammonium with syrup of squills. This is done through ignorance of the fact that the syrup of squills is prepared from the acetum scillæ: —℞ Ammon. carb. ℥i., vin. ipecac. ℥ii., syr. scillæ ℥ss., infus. senegæ ad ℥vi. M. S.—Half an ounce three times a day in water. Ammonium acetate is from this prescription formed with the liberation of carbonic acid. Tinctura scillæ would be compatible, with syrup to sweeten the mixture.

Polypharmacy.—All practitioners who feel inclined to huddle drugs together into a mixture should remember the ludicrous conception of a Chinese mandarin, who, when ill, was wont to summon twelve physicians, and to take all the medicines prescribed, so that in the midst of such a profusion of shot one missile might hit the mark. When a prescription has more than four ingredients, patients become curious as to the one on which efficacy depends. A case is related where a prescription for asthma contained a number of drugs, and was valuable when other remedies had failed. The patient had each drug of the prescription made up with water and took it. By so doing he lighted upon the basis of the cure, which in this case was the iodide of potassium.

As a summary, with regard to prescribing, we may say—

(*a*) Write distinctly.

(*b*) Beware of incompatibility in direct alkaline and acid substances, as sodii bicarb. and acid. sulph. dil., and when acids or alkalies are embodied in the pharmacopœial preparations, as

ACIDS.	ALKALIES.
Acetum cantharidis.	Sp. ammon. aromat.
Acetum scillæ.	Sp. ammon. fœtidus.
Extractum colch. aceticum.	Tinct. opii ammoniata.
Oxymel scillæ.	Tinct. guaiaci ammoniata.
Syrupus scillæ.	Tinct. valerian. ammoniata.
Tinct. ferri acetatis.	Decoctum aloes co.
Succus limonis.	Liquor arsenicalis.
Syrup. limonis.	
Liquor ferri pernit.	
Tinct. ferri perchlor.	
Liquor strychninæ hydrochloratis.	

(*c*) Do not combine medicines physiologically incompatible, as strychnine and chloral.

(*d*) Indicate incompatibility, absolute or pharmaceutical, when intentionally an acid is mixed with a carbonate. In this case see, by warming if necessary, that carbonic acid is liberated.

(*e*) Generally leave the excipient to the dispenser, and

never prescribe more of a soft extract than there is of a solid ingredient.

(*f*) When substances which are only sparingly soluble in water are prescribed in a mixture, see that sufficient water or other solvent is employed to dissolve the whole. It is common to observe such a mixture as the following prescribed—

℞ Potass. Chlorat. ℥iv.
Aquæ ℥iv. S.

The result of this is that more than half of the salt remains undissolved. Among other substances which are even more sparingly soluble in water are benzoic, boracic, gallic, and salicylic acids, antifebrin, croton-chloral hydrate, citrate of caffeine, exalgine, carbonate of lithium, bitartrate of potassium (cream of tartar), salicin, sulphonal, valerianate of zinc.

(*g*) Do not use contractions if there can be any doubt, from the handwriting, as to the substance intended; write then in full. If this be not attended to, hyd. chlor. may be carelessly dispensed as hyd. perchlor. (corrosive sublimate), or even as hydrate of chloral.

(*h*) The directions should be in English, and in every case very plain and legible. Ludicrous interpretations of illegible writing have been noted. Thus on a label has been inscribed, "Gargle a whole and drink a half teaspoonful every four hours." The writing was here misapprehended; the intention was to direct "George a whole and David a half teaspoonful every four hours," referring to the respective doses to be taken by two members of the same family.

METRIC SYSTEM

The metric system of weights and measures has come largely into use of late years. On the Continent it has been long employed to the exclusion of all others, while in America it seems to be rapidly displacing the older methods. Its uniformity, the extent to which it has been adopted in other countries, its

decimal character, and the avoidance of reductions (as from feet to inches, and so on), confer on it undeniable advantages, not only in scientific calculations but in trade transactions of almost all kinds. The student should therefore be acquainted with it, otherwise many matters in foreign scientific works will be to him unintelligible. The tables given below show the relation of the metric to the English weights and measures. In prescribing and dispensing, however, the metric system will be found to be much less workable than the present method; it is accordingly little likely to supersede it in this country. The facts that materials prescribed and dispensed by *weight* would universally, in the case of fluids at least, be consumed by *measure*, that the prescriber would constantly have to bear in mind the exact relation of weight to bulk—an obvious source of confusion in ordering complex mixtures—and that mistakes would be just as apt to occur from the misplacement of the decimal point as from the misreading of the scruple, drachm, and ounce signs, appear to be fatal to the pretensions of this system to any practical superiority.

MEASURES OF LENGTH

Millimètre	0·001 of a mètre	0·03937 inch.	
Centimètre	0·01 ,,	0·3937 ,,	
Décimètre	0·1 ,,	3·9377 inches.	
MÈTRE . . .		39·3779 ,,	
Décamètre	10 mètres	393·7790 ,,	= 32 ft. 9·7 in.
Hectomètre	100 ,,	3937·7900 ,,	= 328 ft. 1·07 in.
Kilomètre	1000 ,,	3937·79000 ,,	= 1093·633 yds.
Myriamètre	10000 ,,	39377·90000 ,,	= 6·213 miles.

The English inch = 2·539 centimètres, or 0·025 mètre.
,, foot = 3·0479 décimètres, or 0·304 mètre.
,, yard = 0·9143 mètre.
,, mile = 1·6093 kilomètre.

WEIGHTS

Milligramme	0·001 of a gramme .	0·015 grain.	
Centigramme	0·01 ,,	0·154 ,,	
Décigramme	0·1 ,,	1·543 ,,	
GRAMME . . .		15·432 grains.	
Décagramme	10 grammes	154·323 ,,	
Hectogramme	100 ,,	1543·234 ,,	= 0·22 lb. av.
Kilogramme	1000 ,,	15432·348 ,,	= 2·204 lb. av.
Myriagramme	10000 ,,	154323·488 ,,	= 22·046 lb. av.

The English grain = 6·479 centigrammes, or 0·064 gramme.
,, ,, drachm = 3·84 (or nearly 4) grammes.
,, ,, ounce (avdp.) = 28·349 grammes.
,, ,, ounce (troy) = 31·103 grammes.
,, ,, pound (avdp.) = 453·592 grammes.

MEASURES OF CAPACITY

Millilitre or	1 cubic centimètre	0·061	cubic inch.
Centilitre	10 ,, centimètres	0·610	,, ,,
Décilitre	100 ,, ,,	6·102	,, inches = 0·176 pt.
Litre = cubic decimètre .	.	61·027	,, ,, = 1·76 ,,
Décalitre .	. . .	17·607	pints = 2·2 gallons.
Hectolitre .	. . .	22·009	gallons.
Kilolitre = cubic mètre .	.	220·09	,,
Myrialitre .	. . .	2200·96	,,

The English cubic inch = 16·386 cubic centimètres.
,, ,, ,, foot = 28·315 cubic décimètres.
,, ,, gallon = 4·543 litres.

Prescribing will be facilitated by bearing in mind the following *approximate* equivalents :—

M. i. or gr. i.	= 0·06	cubic centimètre	or 0·06	gramme.
M. xv. or gr. xv.	= 1	,, ,,	or 1	,,
F. ℥i. or ℥i.	= 4	,, centimètres	or 4	grammes.
F. ℥i. or ℥i.	= 32	,, ,,	or 32	,,

The gramme and the cubic centimètre, when referring to liquids, may be regarded as equal, except when the liquids are very heavy or very light.

An ordinary teaspoon holds about 5 cubic centimètres, an ordinary tablespoon about 20 c.c.

100 grms. or c.c. of water make about 20 teaspoonfuls, or 5 tablespoonfuls.

The following is an example of a prescription calculated according to both styles :—

℞ Pepsinæ (B. P.) . .	℥i. . . .	4	00 grm.
Acid. Hydrochlor. dil.	℥iss. . . .	6	00 c.c.
Syr. Aurant. . . .	℥i. . . .	32	00 c.c.
Inf. Calumbæ ad . .	℥viii. (M.) .	ad 250	00 c.c. (M.)

A line is frequently used instead of the decimal points, as being less likely to give rise to errors.

Powders, pills, and similar preparations are ordered in the metric system in the following manner :—The prescription for pills or powders is based upon ordering fifteen, then each grain desired in a single pill will correspond with one gramme of the sum total.

Recipe—Potassii Bicarbonatis (gr. ii. in each powder) 2 grm.
Pulveris Cinnamomi Compositi (gr. iv. in each powder) 4 grms.
Bismuthi Subnitratis (gr. vi. in each powder) 6 grms.
Misce.—Divide into xv. powders.

For the sake of simplicity in prescriptions, it is well to order of the powder a number which is either a factor or a multiple of a factor of 15.

Recipe—Calomelanos gr. i. in each powder = grm. i., less $\frac{1}{3}$ = grm. $\frac{2}{3}$ . . .	= 0	63 grm.
Pulveris Rhei gr. vi. in each powder = grm. vi., less $\frac{1}{3}$ = grm. iv. . . .	= 4	00 ,,
Pulveris Cretæ Præparatæ gr. iii. in each powder = grm. iii., less $\frac{1}{3}$ = grm. ii. .	= 2	00 ,,

Misce.—Divide into ten powders (15 – $\frac{1}{3}$ of 15 = 10).

In ordering dry preparations of powders or pills, a slight error should not be overlooked, viz. for every grain we order in a dose we get a larger quantity than this, *e.g.* $1\frac{1}{35}$ grain, since 1 gramme equals 15·432 grains.

Thermometric Scales

In the Centigrade (or Celsian) scale, used universally in Continental works on Medicine, the freezing point of water is taken as zero, and the distance from it to the boiling point of water is divided into 100 degrees; Fahrenheit's scale, on the other hand, begins at 32 degrees below the freezing point of water, from which latter to the boiling point of water it is divided into 180 degrees. So that in the Centigrade scale the freezing and boiling points of water are 0° and 100° respectively, in Fahrenheit's scale 32° and 212°. Degrees Fahrenheit therefore bear to degrees Centigrade the relation of 180 to 100, that is, 9 to 5; but in calculating, the extra 32 degrees of Fahrenheit's scale must be kept in mind, and must be first subtracted in converting F. into C., and added, after multiplying and dividing, in converting C. into F. The rules will therefore stand thus: To convert degrees F. into degrees C., first subtract 32°, and then multiply by 5 and divide by 9; to convert degrees C. into degrees F., multiply by 9, divide by 5, and add 32°. Example:

Reduce 98·4° F. to degrees C.;

98·4 – 32 = 66·4
66·4 × 5 = 332·0
332·0 ÷ 9 = 36·8° C.

Convert 39·5° C. into degrees F.

39·5 × 9 = 355·5
355·5 ÷ 5 = 71·1
71·1 + 32 = 103·1° F.

I.—ALTERATIVES AND RESOLVENTS[1]

Hydrargyrum et Potassii Iodidum.

1. Recipe—Hydrargyri Perchloridi granum, Potassii Iodidi drachmas tres, Decocti Sarsæ Compositi uncias sex. Solve et Misce.
Signa—A tablespoonful thrice daily after food.

Mercury and Gentian.

2. ℞ Hydrarg. Perchlor. gr. i., Ext. Gentian. grs. xviii. M.—Divide into twelve pills; one thrice daily.
Useful in secondary syphilis.

Donovan's Triple Solution.

3. ℞ Liquoris Arsenii et Hydrargyri Iodid. ℥iij., Tinct. Zingib. ℥iij., Aquæ ad ℨvj. M.—A tablespoonful thrice daily after food.
Useful in secondary syphilis and some skin eruptions.

Arsenic and Cinchona.

4. ℞ Liquor. Arsenicalis ℥j., Tinct. Cardamom. Co. ℥iij., Decoct. Cinchon. ad ℨvj. M.—A tablespoonful thrice daily after food.
Useful in various skin affections, chorea, chronic cerebral congestion.

Iodide of Potassium and Calumba.

5. ℞ Potass. Iodid. ℥ij., Infus. Calumbæ ℨvj. S.—A dessertspoonful thrice daily.
Useful in various diseases, syphilitic or otherwise.

Guaiacum Mixture.

6. ℞ Tinct. Guaiaci Ammon. ℥iij., Tinct. Aconiti m. xx., Mucil. Acac. ℥i., Aquæ Camph. ad ℨvj. M.—Two tablespoonfuls thrice daily.
Recommended in Cynanche tonsillaris and some skin affections.

Guaiacum, Iodide of Potassium, and Colchicum.

6*a*. ℞ Pulv. Guaiaci, Potass. Iodid. āā gr. 120, Tinct. Colchici ℥iii., Aq. Cinnamomi, Syrupi āā q.s. ad ℨvi. S. et M.—A dessertspoonful or a tablespoonful thrice daily.
Useful in chronic rheumatism.

[1] The prescription in each division of remedies is printed in unabbreviated Latin.

Salicylic Acid in Small-pox.

6*b*. ℞ Acidi Salicylici gr. xx., Sodii Bicarb., Ammon. Carb. āā gr. iv. M.—To be taken in water every two or three hours in the early stage of small-pox; or, in the later stages, with the addition of 5-grain doses of the Citrate of Iron and Ammonia.

Carbolic Acid.

6*c*. ℞ Acidi Carbolici, Glycerini, Gelatinæ āā ʒi., Aquæ ʒxxi. M.—As soon as small-pox pustules form, prick them, and apply this lotion. Patient should also take a warm bath daily.

Chlorate of Potassium.

7. ℞ Potass. Chlorat. ʒij., Glycerini ʒi., Aquæ Camph. ad ʒviij. S. et M.—A tablespoonful every four hours.
Recommended in inflammatory affections of the mouth, etc.

Mercury, Rhubarb, and Soda.

8. ℞ Hydrarg. c. Cretâ gr. ij., Pulv. Rhei gr. ij., Sodii Bicarb. ℥ gr. iij. M.—Make a powder. One at bedtime.
Recommended in various infantile or children's diseases.

Condurango Bark.

8*a*. ℞ Cort. Condurango ʒss., Aquæ ʒxii. Macerate for 12 hours, and then boil down to ʒvi. One to two tablespoonfuls twice daily.
Recommended for cancer of the stomach by Friedreich.

Zittmann's Decoction (Strong).

Decoctum Zittmanni Fortior.

8*b*.[1] 420·0, Sarsaparilla Root, with 30 kilogrammes of water, are macerated for 24 hours; then Alum is added 25·0, Calumb. 2·5, Cinnab. 4·5, and the decoction is boiled until 10 kilogrammes result. Anise Seeds 15·0, Senna 100·0, Liquorice Root 50·0, are added, and the whole boiled, pressed, and strained.

Decoctum Zittmanni Mitius.

The root and branches of Sarsaparilla 230·0 and 30 kilogrammes of water are boiled down to 20 kilogrammes; then Cortex Citri, Cassia, Cinnamon, Cardamoms, Liquorice Root, of each 12·0, are added, boiled, and the whole pressed.
Of the strong decoction, a dessertspoonful may be taken

[1] The weights here indicated are in *grammes*.

thrice daily. Of the weak decoction, a tablespoonful thrice daily.

Recommended specially by German authorities in constitutional syphilis.

II.—ANTACIDS

Bismuthum, Acidum Hydrocyanicum Dilutum, etc.

9. Recipe—Liquoris Bismuthi et Ammonii Citratis unciam dimidiam, Acidi Hydrocyanici Diluti minima quadraginta, Tincturæ Cardamomi Compositæ drachmas tres, Spiritus Chloroformi drachmam cum semisse, Aquæ ad uncias sex. Misce.

Signa—A tablespoonful thrice daily before food.

Recommended in dyspepsia, for vomiting and pain in gastric ulcer, and in hooping-cough.

Ammonia, Potash, and Chiretta.

10. ℞ Ammon. Carb. ℥j., Potass. Bicarb. ℥iss., Inf. Chiratæ ℥vj. S.—A tablespoonful thrice daily before food.

Useful for the acid eructations of dyspepsia and debility.

Magnesia and Soda.

11. ℞ Magnes. Levis ℥ss., Sodii Bicarb. gr. xx., Tinct. Aurantii ℥ss., Aquæ Menth. Pip. ℥i. M.—The draught; for heartburn, etc.

Creasote.

11*a*. ℞ Creasoti m. i., Tinct. Camph. Co. m. 30, Spirit. Chloroform. m. 15, Glycerini ℥i., Aquæ ℥i.

In vomiting or heartburn.

Salicylic Acid Mixture.

11*b*. ℞ Acidi Salicylici drachmas duas, Potassii Acetatis drachmas quatuor cum semisse, Aquæ uncias sex. Solve.—A tablespoonful every three hours.

Given by some in acute rheumatism, as combining the Salicylate and Alkaline treatment.

III.—ANTIPYRETICS

Liquor Ammonii Acetatis, Spiritus Ætheris Nitrosi.

11*c*. Recipe—Liquoris Ammonii Acetatis unciam dimidiam, Spiritus Ætheris Nitrosi, Tincturæ Hyoscyami ana drachmas tres, Aquæ Camphoræ ad uncias sex. Misce.

Signa—A tablespoonful every two hours. Used as an antipyretic at the commencement of Febricula.

11*d*. ℞ Sulphatis Quininæ gr. xxx.
Suspended in milk, this powder is sometimes ordered to reduce temperature in typhoid fever.

Injectio Sulphatis Quininæ.

11*e*. ℞ Quininæ Sulphatis gr. xxxvi., Acidi Tartarici gr. xv., Aquæ ℥ss. 20 drops as a hypodermic injection contain 3 grains of Sulphate of Quinine. This injection causes no abscesses, and is useful in fever.

Salicin.

11*f*. ℞ Salicini gr. xxv. One powder in milk every two hours in acute rheumatism.

OFFICIAL ANTIPYRETICS

11*g*. *Antipyrin.*—A synthetically prepared alkaloid, readily soluble in water, with a sweetish bitter taste.
Dose—30 grains hourly for three hours. For children, a grain and a half for every year of the child's age may be given hourly for three hours. It may also be injected subcutaneously in half its weight of hot water.

11*h*. *Antifebrin.*—A pure white crystalline powder, odourless, and producing a slight burning sensation on the tongue. Prepared by the action of glacial acetic acid upon anilin. Soluble in 180 parts of water at 6° C., more soluble in boiling water, freely soluble in alcohol, in wine, and in ether.
Dose—3 to 15 grains; not exceeding 30 grains in the twenty-four hours.

11*i*. *Phenacetin.*—An analogue of Antifebrin; a powder, pinkish in colour, without taste or odour, scarcely soluble in water, freely soluble in hot alcohol. Said to be entirely free from unpleasant after-effects. Dose for an adult, 8 to 12 grains.

NON-OFFICIAL ANTIPYRETICS

11*j*. *Kairin.*—Dose, 3 to 30 grains. Best given in wafer-paper or a capsule.

11*k*. *Thallin.*—Dose, 5 grains or more.

11*l*. *Phenocoll Hydrochloride.*—Dose, 8 to 10 grains.
This compound is freely soluble, and 8 grains reduce the febrile temperature as much as 12 to 16 grains of antipyrin.

IV.—ANTISPASMODICS

Lobelia, Æther.

12. Recipe—Tincturæ Lobeliæ drachmas duas, Spiritus Ætheris drachmas tres, Tincturæ Conii drachmas duas, Misturæ Ammoniaci ad uncias sex. Misce.

Signa—A tablespoonful every three hours.
Useful in asthma and paroxysmal coughs.

Cardamoms and Ammonia.

13. ℞ Acid. Hydrocyan. dil. m. xl., Spt. Ammon. Aromat. ʒij., Tinct. Card. Co. ʒiv., Tinct. Zingib. ʒiij., Spt. Chloroform. ʒij., Aquæ Carui ad ℥vj. M.—A tablespoonful to be taken occasionally.

For flatulence or colic.

Valerian and Asafœtida.

14. ℞ Tinct. Valerian., Tinct. Asafœt. āā ʒij., Tinct. Lavand. Co. ʒiss., Pulv. Frag. Co. ʒi., Aquæ ad ℥vj. M.—A tablespoonful every three hours. For hysteria, etc.

Chloral, Bromide of Potassium, and Morphine.

14*a*. ℞ Chloral Hydratis, Potass. Bromid., Potass. Bicarb. āā ʒi., Liq. Morph. Hydrochlor. ʒi., Aquæ ad ℥vi. S. et M.—A small tablespoonful every three hours.

Gibb's Nitric Acid Mixture.

15. ℞ Acid. Nitric. dil. ʒxii., Tinct. Card. Co. ʒiij., Syrup. ʒiiiss., Aquæ ʒj. M.—A small teaspoonful every two hours.

For hooping-cough.

Dr. Fuller's Belladonna Mixture.

15*a*. ℞ Zinc. Sulphat. gr. viii., Ext. Belladon. gr. vii., Aq. ʒiv. S.—A teaspoonful four times daily, and increased by one dose daily to a child above three years old.

V.—ASTRINGENTS

Acidum Sulphuricum Dilutum cum Tincturâ Opii.

16. Recipe—Acidi Sulphurici Diluti drachmas duas cum semisse, Tincturæ Opii drachmam, Spiritûs Chloroformi drachmas duas, Aquæ Menthæ Piperitæ ad uncias sex. Misce.

Signa—A tablespoonful after every liquid stool, in diarrhœa.

Catechu, Opium, and Chalk.

17. ℞ Tinct. Catechu ℥iij., Tinct. Opii ℥j., Pulv. Cinnam. Co. ℥iss., Mist. Cretæ ad ℥vj. M.—A tablespoonful after every liquid stool ; for adults.

For excessive diarrhœa of typhoid fever.

Chalk-Mixture, Cinnamon, and Opium.

18. ℞ Tinct. Opii m. x., Pulv. Cinnam. Co. ℥j., Mist. Cretæ ℥vi., Aquæ Cinnamomi ad ℥iv. M.—A teaspoonful may be given every hour.

For diarrhœa of children, and in chronic dysentery.

18*a*. ℞ Ol. Anisi, Ol. Cajuputi, Ol. Juniperi āā ℥ss., Æther. ℥ss., Liq. Acid. Halleri ℥ss.,[1] Tinct. Cinnamom. ℥ii. M.—Ten drops every quarter of an hour in a little water. An opiate may be given with the first and second dose.

Used to promote reaction in cholera and diarrhœa.

Gallic Acid.

19. ℞ Acid. Gallici gr. x., Aquæ ℥iss. S.—To be taken every four hours.

Useful in hæmoptysis and various hæmorrhages, and in chronic dysentery.

Lead and Opium.

19*a*. ℞ Pil. Plumb. cum Opio (gr. v.) xii.

Sig.—One after every stool in diarrhœa of typhoid fever, if stools exceed four daily.

Bismuth Mixture.

20. ℞ Bismuth. Subnitrat. ℥j., Pulv. Tragacanthæ Co. ℥i., Glycerini ad ℥vi. M.—A tablespoonful every three hours.

Useful in diarrhœa of phthisis.

Cascarilla, Squill, and Dilute Sulphuric Acid.

21. ℞ Tinct. Scillæ ℥iss., Acid. Sulph. dil. ℥iss., Tinct. Opii ℥ss., Inf. Cascarillæ ad ℥vj. M.—A tablespoonful every three hours.

Useful in chronic bronchitis, to check excessive expectoration.

[1] Liquor Halleri consists of one part of concentrated sulphuric acid to three parts of rectified spirit.

Starch and Laudanum Enema.

22. ℞ Tinct. Opii ʒss., Ol. Terebinth. m. x., Mucilag. Amyli ʒii. M.

Employed to check the diarrhœa of typhoid fever, when excessive.

Kino.

22*a*. ℞ Pulv. Kino Comp. grs. xv.

The powder—one every six hours.

In dysentery and chronic diarrhœa.

Logwood and Catechu.

22*b*. ℞ Ext. Hæmatox. grs. xii., Aq. Cinnam. ʒxv., Tinct. Catechu ʒi. M.

The draught—after each loose stool.

In dysentery and diarrhœa.

VI.—CATHARTICS AND ANTHELMINTICS

Calomel et Jalapa.

23. Recipe — Hydrargyri subchloridi grana quinque, Pulveris Jalapæ grana quindecim. M.

An active purgative.

Pulvis Alterans Plummeri (Plummer's Alterative Powder).

23*a*. In the German Pharmacopœia is thus prepared—Calomel., Stibii Aurant. Sulf. āā 0·05, Sacch. 0·5.—One to three powders given as an alterative.

Sulphate of Magnesium and Sulphuric Acid.

24. ℞ Magnes. Sulph. ʒij., Acid. Sulph. dil. ʒiss., Tinct. Card. Co. ʒiss., Aquæ Menth. Pip. ad ʒvj. M.—A wine-glassful every half-hour, until bowels act freely.

Aqua Purgativa (Eau Purgative Gazeuse).

24*a*. Crystallised Phosphate of Soda 40·0, Sod. Bicarb. 5·0, Aq. Destill. 625·0, Acid. Citric. 10·0.—A wine-glassful of this taken before breakfast forms a pleasant draught, and has an aperient action.

Aloes, Ginger, and Jalap.

25. ℞ Tinct. Jalapæ, ʒvi., Syr. Zingib. ʒii., Decoct. Aloes Co. ad ʒvj. M.—An ounce night and morning.

Useful in bilious headache and constipation.

Rhubarb, Soda, and Aloes.

26. ℞ Extract. Rhei gr. x., Sodii Phosphat. ʒj., Decoct. Aloes Co. ʒss., Aquæ Menth. Pip. ʒj. M.
A warm aperient, useful in the early stage of gout.

Elaterium and Colocynth.

27. ℞ Elaterii gr. i., Ext. Colocynth. Co. ʒss., Ext. Hyoscyam. gr. xii. Mix, and divide into twelve pills; one night and morning.
Useful in cardiac or other forms of dropsy.

Mercury and Podophyllin.

27*a*. ℞ Resinæ Podophylli gr. i., Pil. Hydrarg. gr. iii., Ext. Colocynth. Co. gr. iii., Ext. Hyoscyam. gr. ii. M.—Divide into two pills; one at bedtime.

Antimony, Sulphate of Magnesium, and Citrate of Ammonia.

28. ℞ Vin. Antimon. ʒj., Magnes. Sulphat. ʒss., Liquor. Ammon. Citrat. ʒiss., Aquæ ad ʒvj. M.—Two tablespoonfuls twice or thrice daily.
Useful as an aperient in the early stages of various disorders.

Aloes, Nux Vomica, and Gentian.

28*a*. ℞ Ext. Aloes Socotr. gr. i., Ext. Nuc. Vomic. gr. ½, Ext. Gentian. q.s. M.—An after-dinner pill in constipation.

Filix-Mas.

29. ℞ Extracti Filicis Liquidi ʒi., Pulv. Gum. Acaciæ ʒi., Aquæ Menth. Pip. ʒj.—Make an emulsion.
Considered a specific in tapeworm.

Filix-Mas (*Anthelmintic*).

29*a*. Æth. Extr. Fil. Maris 1·5, with powder of root of Male-fern, 2·0.—Early in the morning or in the evening, followed by a purgative.

Elect. Anthelminticum (*Male-fern Root*).

29*b*. Root of Male-fern, Valerian Flowers, Sulphate of Potash, of each 2·5, Aq. Dest. sweetened with honey, 30·0.—In tapeworm this draught to be taken in the evening, followed by a purgative.

Santonin and Scammony.

30. ℞ Santonini gr. ij., Pulv. Scammon. Co. gr. iv. N.—Ft. Pulv. Very effectual in expelling the round-worm or thread-worm in children.

Basilicon Powder.

30*a*. ℞ Calomel, Jalap, Scammony, Cream of Tartar āā 5 grs. M.

The powder for an adult—for children a proportionate dose in cases of thread-worm.

VII.—DIAPHORETICS

Acetatis Ammonii Liquor cum Spiritu Ætheris Nitrosi.

31. Recipe — Liquoris Ammonii Acetatis unciam, Spiritus Ætheris Nitrosi unciam dimidiam, Aquæ Camphoræ ad uncias sex. Misce.

Signa—A tablespoonful every three hours.

Useful in febricular and early stages of inflammatory diseases.

Dover's Powder and Antimony.

32. ℞ Pulv. Ipecacuanhæ Comp. gr. vj., Antimon. Tartarat. gr. ¼. M.—One powder every six hours.

Guaiacum and Nitrate of Potassium.

33. ℞ Pulv. Guaiaci gr. xxx., Potass. Nitrat. gr. xv. M.—To be taken at bedtime (some warm gruel to be taken afterwards).

Useful in chronic rheumatism.

Ipecacuanha and Citrate of Ammonium.

34. ℞ Vini Ipécac. ℥iss., Syrupi ℥ss., Tinct. Camph. Co. ℥iij., Liquor. Ammon. Citrat. ℥ss., Aquæ ad ℥ij. M.—A teaspoonful every two hours.

Useful in catarrhal and febrile affections of children.

Subcutaneous Injection of Pilocarpine.

34*a*. ℞ Pilocarpin. Nitratis ¼ gr., Aquæ m. x. M.—In Bright's disease, as a subcutaneous injection.

VIII.—DIURETICS

Scilla, Scoparium et Ammonii Acetas.

35. Recipe—Tincturæ Scillæ drachmas duas, Liquoris Ammonii Acetatis unciam, Decocti Scoparii ad uncias sex. Misce.

Signa—Two tablespoonfuls thrice daily.

Mercury, Squill, and Digitalis (Guy's Pill).

36. ℞ Pil. Hydrarg. gr. xxx., Pulv. Scillæ gr. vi., Pulv. Digitalis gr. xii. M. — Divide into twelve pills. One twice daily.

Useful in pleurisy or pericarditis, to remove effusion.

Acetate of Potassium, Squill, and Digitalis.

37. ℞ Potass. Acetat. ʒss., Acet. Scillæ ʒss., Spt. Ætheris Nitros. m. xx., Tinct. Digitalis m. v., Decoct. Scoparii ʒiss. M.—The draught thrice daily.

37*a*. ℞ Potass. Acetat. ʒiij., Potass. Citrat. ʒiij., Inf. Digitalis ʒvj. M.—A tablespoonful every three hours.

Bitartrate of Potassium and Buchu.

38. ℞ Potass. Bitart. ʒiij., Inf. Buchu ʒvj. M.—Two tablespoonfuls thrice daily.

Useful as a diuretic, and where there is very acid urine with an excessive secretion of uric acid.

Oil of Juniper, Nitrous Ether, and Digitalis.

39. ℞ Olei Juniperi ʒss., Spt. Ætheris Nitrosi, Vini Ipecac., Tinct. Digitalis āā ʒiij. M.—Twenty-five drops every three hours.

Diuretic, and in some cases also useful as an emmenagogue.

39*a*. ℞ Pot. Bicarb. ʒxii., Acid. Citric. ʒviii., Aquæ ad ʒxii. S.—A teaspoonful in three ounces of water.

Nitrate of Potassium and Barley.

40. ℞ Potass. Nit. ʒii., Acid. Nit. dil. ʒi. Misce.

Signa—To be put into one pint of Decoction of Barley, and drunk daily.

Useful in the early stages of fever as a diuretic.

Trousseau's Diuretic Wine.

40*a*.

Scales of Squill	gr. 80
Dried Digitalis leaves	gr. 140
Juniper Berries	gr. 720
Alcohol of 90° strength	℥4
White wine (containing 9 to 10 per cent of alcohol)	℥20
Dry Acetate of Potassium	gr. 224

Divide and crush the Digitalis leaves, Juniper Berries, and the Scales of Squill; macerate them with the White Wine and Alcohol for 15 days in a closed vessel, agitating frequently; strain, press, and filter. Add the Acetate of Potassium, agitate until the salt is dissolved, and filter.

Dose.—One teaspoonful thrice daily, increasing after 2 days to two teaspoonfuls at each dose.

Jalap and Squills.

40*b*. ℞ Tinct. Jalap. ʒij., Acet. Scillæ ʒi., Aq. Menth. Pip. ʒi. M.—The draught thrice daily.

IX.—EMETICS AND EXPECTORANTS

Antimonium Tartaratum et Vinum Ipecacuanhæ.

41. Recipe—Antimonii Tartarati semi-granum, Vini Ipecacuanhæ drachmam, Aquæ ad unciam cum semisse. Misce.

Useful as an emetic.

42. Recipe—Vini Ipecacuanhæ unciam.
A teaspoonful every ten minutes until vomiting is established.

Sulphate of Zinc.

42*a*. ℞ Zinci Sulphatis ℥ss., Aquæ ℥iss.
S.—A pure emetic.

Tolu, Ammoniacum, and Opium.

43. ℞ Syrupi Tolutani ℥ss., Mist. Ammoniaci ℥ij., Tinct. Camph. Co. ℥iij., Aquæ ad ℥vj. M.—A tablespoonful three times a day.

Useful in chronic bronchitis.

Ammonia, Squill, and Senega.

44. ℞ Ammonii Carbonatis ℥j., Tinct. Scillæ ℥iij., Tinct. Camph. Co. ℥ss., Infus. Senegæ ad ℥vj. M.—A tablespoonful every four hours.
A stimulating expectorant in various chest affections.

Ipecacuanha, Tolu, and Acacia.

45. ℞ Vin. Ipecac. ℥ij., Syrup. Tolutani ℥iv., Mucilag. Acaciæ ad ℥ijs. M.—A teaspoonful every hour or every second hour.
Useful in acute bronchitis or measles with chest symptoms, or chest complications in continued fevers.

Lobelia, Spirit of Chloroform, and Conium.

46. ℞ Tinct. Lobeliæ ℥ij., Spt. Chloroform. ℥iij., Tinct. Conii ℥iij., Mist. Amygdalæ ad ℥vj. M.—A tablespoonful three times a day.

Useful in asthma, etc.

Ipecacuanha, Myrrh, and Potassium Nitrate.

46*a*. ℞ Pulv. Ipecac. grs. vi., Pulv. Myrrhæ grs. xii., Potass. Nitrat. ℥ss. M.—Div. in Pulv. iv. One every four hours.

In chronic bronchitis, asthma, etc.

Ipecacuanha, Squill, and Tolu.

46*b*. ℞ Vini Ipecac., Tinct. Scillæ āā ℥i., Syr. Tolu ℥vi., Mist. Amygdal. ℥v. S.—A tablespoonful when the cough is troublesome.

In asthma, bronchial catarrh, etc.

X.—GARGLES AND INHALATIONS

Gargarisma Acidi Tannici.

47. Recipe—Acidi Tannici grana sexaginta, Aquæ Camphoræ uncias sex. Solve.

Signa—The gargle, to be used frequently.

Myrrh and Alum.

48. ℞ Tinct. Myrrhæ ℥iij., Aluminis ℥j., Infusi Rosæ Acidi ad ℥vj. M.—To be used frequently in mercurial salivation, or scarlatinal or aphthous ulceration of the throat.

Tannin and Glycerine.

49. ℞ Acid. Tannici ℥ss., Glycerini ℥iv. S.—The throat to be touched with this twice or thrice daily in scarlet fever, etc.

Borax and Glycerine.

50. ℞ Boracis ℥j., Glycerini ℥ij. S.

Useful in ulceration of mouth and throat.

Nitrate of Potassium.

51. ℞ Potass. Nitrat. ℥j., Aquæ ℥j.—Saturate white blotting paper in this solution, and dry it; cut the paper into pieces 3 inches long and ½ inch broad. One piece may be lighted and the smoke inhaled. One to six papers may be used in succession for each inhalation.

Recommended as an antispasmodic in asthma.

Hop Inhalation.

52. ℞ Ol. Lupuli ℥ss., Magnesii Carb. Pond. ℥j., Aquæ ad ℥iij. M.—A teaspoonful to be put into a pint of boiling water, and used by Maw's inhaler.

Useful in phthisis, when cough is irritable, and in various chest affections.

Eucalyptus Inhalation.

52*a*. ℞ Ol. Eucalypti, Spt. Chloroformi, āā ℥ss. Forms a good inhalation.

Creasote Inhalation.

53. ℞ Creasot. ʒiij., Magnes. Carb. Pond. ʒiss., Aquæ ad ℥iij. M. ; or,

Carbolic Acid Inhalation.

53*a*. ℞ Acid. Carbolici ʒi., Glycerini ʒi., Aquæ ʒvi. S.—A teaspoonful in a pint of water at 150° F. for each inhalation. Useful in chronic congestion of the larynx, and in hooping cough.

Pine Inhalation.

54. ℞ Ol. Pini Sylvestris ʒij., Magnes. Carb. Pond. ʒj., Aquæ ad ℥iij. M.—A teaspoonful in a pint of water at 150° F. for each inhalation.

Ipecacuanha Spray.

54*a*. Dr. Ringer recommends this in chronic bronchitis, in the form of Vinum Ipecacuanhæ, at first daily, then twice a day. ʒss. of Vin. Ipecac. diluted with ʒiii. of water is placed in a ball spray apparatus, and, compression being used, the spray is directed into the patient's mouth, while he is told to close his nose with his fingers and breathe deeply. In cold weather, the spray should be warmed. The patient is also directed to rinse out the mouth with water at each pause in the administration, for more wine collects in the mouth than passes into the lungs, and, if swallowed, this might produce nausea and vomiting.

XI.—POWDERS, LOTIONS, LINIMENTS, ETC.

Amylum, Zinci Oxidum et Camphora.

55. Recipe—Pulveris Amyli, Zinci Oxidi ana uncias duas, Pulveris Camphoræ drachmam. Misce.
May be used in acute eczema, erysipelas, or shingles.

Dilute Hydrocyanic Acid and Perchloride of Mercury.

55*a*. ℞ Acid. Hydrocyanici dil. ʒi., Hydrarg. Perchlor. gr. ii., Mist. Amygdalæ ad ℥vi. M.
For external use. Useful in prurigo and various skin affections attended with itching.

Cajuput, Opium, Turpentine, and Ammonia.

55*b*. ℞ Ol. Cajuputi, Tinct. Opii āā ʒii., Ol. Terebinth ℥iv., Liniment. Ammon. ℥i.
This liniment should be applied in chronic rheumatism when a stimulating embrocation is indicated.

Prussic Acid and Potash.

56. ℞ Liquoris Potassæ ℥ij., Acid. Hydrocyanici dil. ℥j., Aquæ ad ℥vj. M.

Useful in pityriasis.

Carbolic Acid and Glycerine.

56*a*. ℞ Acidi Carbolici gr. viij., Glycerini ℥ss., Aquæ ad ℥j. S. et M.

Applied to pustules in small-pox.

Bicarbonate of Sodium and Glycerine.

57. ℞ Sodii Bicarb. ℥i., Glycerini ℥iss. Solve.
S. — The lotion. Useful in the itching of cutaneous diseases.

Lead and Glycerine Lotion.

57*a*. ℞ Liq. Plumbi Subacetatis ℥i., Glycerini ℥iii., Aquæ ad ℥vi. M.
Recommended in acute eczema, especially of the face.

Prussic Acid Lotion.

57*b*. ℞ Acid. Hydrocyan. dil. ℥ii., Sodii Bicarb. ℥i., Glycerini ℥vi., Aquæ Rosæ ad ℥vi. M.
Used in acute eczema and for the relief of pruritus.

Oxide of Zinc Lotion.

57*c*. ℞ Zinci Oxidi ℥iv., Glycerini ℥i., Liquoris Calcis ℥ii., Aquæ Rosæ ad ℥vi. M.
Of service in acute eczema and acne rosacea.

Lotion of Potash Soap.

57*d*. ℞ Saponis Mollis, Spt. Rect. āā ℥i., Ol. Rosmarini m. iv., Aquæ ad ℥iv. M.—Rub in well night and morning.
Useful in psoriasis, acne, and chronic eczema with much thickening.

Lotion of Potassa Fusa.

57*e*. ℞ Potass. Fusæ gr. v.-xx., Aquæ ℥i. Solve.—Paint on at night, washing off when smarting becomes severe.
Valuable in the later stages of chronic eczema with much thickening.

Sulphur Lotion.

57*f*. ℞ Sulphuris ℥iii., Glycerini ℥iv., Spt. Rect. ad ℥iv. M. S.—Rub in at night. Valuable in acne vulgaris.

Carbolic Acid and Glycerine.

57*g*. ℞ Acid. Carbol. pur. ʒii., Glycerini ʒi. M.
Very useful in ringworm of the head ; for a child of ten. About half or one-third this strength for a child of three or four.

Liniments of Belladonna, Chloroform, and Opium.

57*h*. ℞ Linimenti Belladonnæ ʒi., Liniment. Chloroform. ʒi., Liniment. Opii ʒii. M.
In chronic rheumatism, a teaspoonful placed on flannel and rubbed into the affected part.

57*i*. ℞ Lin. Aconit., Lin. Belladon., Lin. Chloroform, āā ʒi.
Directions as in 57*h*.

Corrosive Sublimate Lotion.

58. ℞ Hydrarg. Perchloridi gr. iv., Spt. Rect. ʒiv., Aquæ ad ʒii. M.—Rub in night and morning.
Used in tinea of all kinds.

Corrosive Sublimate and Soap.

58*a*. ℞ Hydrarg. Perchlor. gr. viii., Saponis Mollis ʒiss., Spt. Rect. ʒiss. Solve—To be rubbed in night and morning.
Especially useful in tinea versicolor.

Corrosive Sublimate and Sal-Ammoniac.

58*b*. ℞ Hydrarg. Perchlor. gr. iii., Ammon. Chloridi. ʒii., Tr. Benzoini Co. ʒii., Aquæ Rosæ ad ʒviii. M.
An excellent lotion for lentigo and other pigmentary spots.

Hyposulphite of Sodium.

58*c*. ℞ Sodii Hyposulphitis ʒii., Glycerini ʒiv., Aquæ Rosæ ad ʒiv. M.
Useful in all varieties of tinea.

Austro-German "Yellow" and "Black" Washes.

58*d*. Aq. Phagedænica Lutea (yellow wash)—Hydrarg. Mur. Corros. Pulv. 0·1, Aquæ Calcis 30·0.
Aq. Phagedænica Nigra (black wash)—Calomelanos 2·0, Pulv. Opii 2·5, Aq. Calcis 100·0.
Washes employed in syphilitic ulcers.

XII.—OINTMENTS

Plumbum et Vaselinum.

59. Recipe—Emplastri Plumbi, Vaselini, ana uncias duas. Misce—Apply on strips of lint twice a day.
Most valuable in subacute eczema, especially of the limbs. A modification of Hebra's Ungt. Diachyli.

Oxide of Zinc and Camphor.

59*a*. ℞ Spt. Camph. ʒi., Glycerini ʒii., Ungt. Zinci ʒi. M.
Useful in eczema, especially in children.

Oil of Cade.

60. ℞ Ol. Cadini., Spt. Rect., Sapon. Mollis, āā ʒj., Spt. Lavand. ʒiiss. M.
Recommended by Dr. M'Call Anderson in chronic eczema.

Oil of Cade and Glycerine of Starch.

60*a*. ℞ Ol. Cadini ʒii., Glycerini Amyli ad ʒi. M.
A mild stimulant. Used in chronic eczema.

Sulphur and Potash.

60*b*. ℞ Sulphuris Sublim. ʒii., Potass. Carb. ʒi., Adipis ʒi. M.
Used in scabies. To be rubbed in firmly over whole surface, except face and head, for three nights in succession after hot bath.

Storax.

60*c*. ℞ Styracis Præparat. ʒii., Adipis ʒi. M.
Used for scabies in patients with a delicate skin.

Bismuth, Zinc, and Prussic Acid.

61. ℞ Bismuthi Subnitrat. ʒj., Ungt. Zinc. ʒj., Acid. Hydrocyanici dil. ʒj. M.
Useful in various skin affections.

62. ℞ Balsami Peruviani ʒij., Olei Rosmarini m. xx., Tinct. Cantharid. ʒj., Olei Ricini ʒss., Adipis Præp. ʒiss. M.
To be rubbed in night and morning to roots of hair in cases of baldness, after syphilis, fevers, etc.

Aconitine and Iodine.

63. ℞ Aconitinæ gr. ij., Ungt. Iodi ʒj. M.—A little to be painted over part in severe neuralgia (tic-douloureux).

Citrine Ointment.

64. ℞ Ungt. Hydrarg. Nit. ʒi., Adipis ad ʒi. M.
Used in vesicular, squamous, and some parasitic affections.

White Precipitate.

64*a*. ℞ Hydrarg. Ammoniat. gr. xii., Vaselini ʒi. M.—Rub in at night.
A mild parasiticide and a stimulant in chronic eczema.

Tar and Mercury.

64*b*. ℞ Ungt. Hydrarg. Nitratis ʒiss., Picis Liquidæ vel. Ol. Cadini ʒii., Adipis Benzoat. ad ʒi.
Used in chronic eczema and for pruriginous eruptions.

Iodide of Sulphur Ointment.

65. ℞ Sulph. Iodid. gr. x., Sulph. Sublim. gr. x., Acid. Hydrocyan. dil. m. x., Adipis ʒi. M.
Used in acne and other skin affections.

Chrysophanic Acid Ointment.

65*a*. ℞ Acidi Chrysophanici ʒi., Lanolin ʒi. Mix at a temperature of 90° in a water bath. About the size of a bean to be rubbed into each patch of psoriasis daily.

Compound Citrine Ointment.

(Dr. Alder Smith's.)

65*b*. ℞ Acid. Carbol. Pur., Ungt. Hydrarg. Nitratis, Ungt. Sulphuris, āā ʒi. M.—Rub in every night.
Most valuable in ringworm of the head ; for children under ten double or treble the amount of sulphur ointment.

Oleate of Mercury.

65*c*. ℞ Hydrarg. Oleat. (5 %) ʒvii., Ætheris Acet. ʒi. M.—Rub in night and morning.
Very serviceable in ringworm of the head.

Cod-liver Oil Emulsion.

65*d*. ℞. Ol. Morrhuæ ʒii., rub up with 30 grs. of Pulv. Acaciæ and ʒiss. of Aq. Destill. till an emulsion is formed ; then gradually add with constant trituration ʒi. of Aq. Menth. Pip.

Depilatory.

65*e*. ℞ Sodii Sulphidi ʒiii., Calcis ʒx., Amyli ʒx. M.—Mix with water to make a paste ; apply to the skin for two minutes, then scrape off.

65*f*. Barii. Sulphuret. ʒiss., Zinci. Oxid. ʒvi., Carmin. gr. i. M.—Applied as in directions under 65*e*.

Creasote Ointment.

65*g*. ℞ Creasoti ʒi., Ung. Cetacei ʒi. M.—In prurigo.

Zinc Gelatine Ointment.

65*h*. ℞ Zinc. Oxid. Gelatine āā 15, Glycerine 25, Water 45. M.—In eczema.

XIII.—SALINES

Spiritus Ammoniæ Aromaticus, Liquor Ammonii Citratis, Syrupus Limonis.

66. Recipe — Spiritus Ammoniæ Aromatici drachmas tres, Liquoris Ammonii Citratis uncias quatuor, Syrupi Limonis unciam, Aquæ ad uncias octo. Misce.
Signa—A tablespoonful every three or four hours.
Useful in early stages of tonsillitis, diphtheria, or in febricula.

Chlorate of Potassium (Fever-drink).

67. ℞ Potass. Chlorat. ℥j., Aquæ Oj. S.
Recommended as a daily drink in scarlet or other fever.

Colchicum and Magnesia.

68. ℞ Tinct. Colchici ℥iss., Magnes. Carb. Pond. vel. Levis, ℥ij., Aquæ ad ℥vj. M. S.—A tablespoonful every three hours.
Useful in gout.

68*a*. ℞ Vini Colchici ℥ss., Magnes. Carb. gr. xv., Magnes. Sulphat. ℥j., Aquæ Cinnamom. ad ℥ij. M.
This draught is recommended by Sir Charles Scudamore during the paroxysm of gout.

Dr. Mortimer Granville's Prescription for Gout.

68*b*. ℞ Ammonii Chloridi ℥iv., Potassii Chloratis ℥ii., Tincturæ Iodi ℥ii., Glycerini ℥iss., Aquæ ad ℥xii. S. et M.
S.—Two tablespoonfuls every four hours in water.

Also in gout, if fever is sthenic, Dr. Granville recommends—

68*c*. ℞ Tincturæ Aconiti (B. P.) ♏xii., Ammonii Phosphatis ℥iss., Decocti Scoparii ℥xii. M.
S.—Two tablespoonfuls every third or fourth hour.

XIV.—SEDATIVES

Potassii Bromidum et Chloral Hydras.

69. Recipe—Potassii Bromidi drachmas tres, Hydratis Chloral drachmas duas, Aquæ uncias sex. Misce.
Signa—A tablespoonful every two hours to an adult. To a child a teaspoonful.
Useful in the convulsions of children or in laryngismus stridulus. Also in delirium tremens and in fevers, when there is great restlessness.

Opium and Antimony.

70. ℞ Tinct. Opii ʒii., Antimonii Tartar. gr. iv., Aquæ Camph. ad ʒvj. M.—A tablespoonful every two hours until sleep is produced.

Useful in delirium tremens.

Mixture of Bromide of Potassium.

70*a*. ℞ Ol. Aurantii, Ol. Anisi, Ol. Caryophylli, āā m. i., Spirit. Rect. ʒi., Syrupi ʒi., Sacchari usti. q.s. M.

℞ Potass. Bromid. ʒiii., Aquæ ʒivss. M.

Mix the two solutions.

S.—A dessertspoonful in a half-glassful of water at bedtime. Taste pleasant; recommended in sea-sickness.

Morphine and Hydrocyanic Acid.

71. ℞ Morphinæ Hydrochlor. gr. i., Acid. Hydrochlor. dil. m. v., Acid. Hydrocyanic. dil. ʒss., Syrup. Scillæ ʒj., Aquæ ʒi. M.—One teaspoonful to be taken when cough is very severe, as in advanced cases of phthisis.

Bromide of Potassium and Ergot.

71*a*. ℞ Potass. Bromid. ʒiij., Extract. Ergotæ Liquid. ʒij., Aquæ ad ʒvj. M.—A tablespoonful three times a day.

Useful in cerebral congestion, and also in infantile spinal paralysis in early stage.

Brown-Séquard's Mixture of Bromide of Potassium, for Epilepsy.

71*b*. Recipe—Potassii Iodidi drachmas duas, Potassii Bromidi unciam, Ammonii Bromidi drachmas tres, Potassii Bicarbonatis drachmam, Tincturæ Calumbæ unciam, Aquæ Destillatæ ad uncias sex. Misce.

To adults four doses a day, three of one teaspoonful each before meals, and the fourth of three teaspoonfuls at bedtime with as much water as desired.

71*c*. Pulv. Doveri. The German Pharmacopœia Dover's powder is thus prepared, 0·08 of Pulv. Opii, 0·08 of Pulv. Ipecac., and 0·6 of Sugar.

Hydrocyanic Acid.

71*d*. ℞ Acid. Hydrocyan. Dil. ♏4, Tinct. Calumb. ʒi., Aquæ ʒxi. M. S.—The draught in irritable dyspepsia.

XV.—STIMULANTS

Spiritus Chloroformi et Mistura Spiritûs Vini Gallici.

72. Recipe—Spiritûs Chloroformi drachmas duas, Misturæ Spiritûs Vini Gallici ad uncias sex. Misce.

Signa—A tablespoonful every two hours in the low stages of fevers or other exhausting diseases.
An agreeable restorative.

Ammonia, Potash, and Rhubarb.

73. ℞ Spt. Ammon. Aromat., Liquor. Potass., Tinct. Rhei, āā ℥j. M. S.—A teaspoonful twice a day in water, as an antacid stimulant and stomachic.

Soda and Calumba.

74. ℞ Sodii Bicarb. ℥j., Tinct. Calumb. ℥vj., Aquæ Anethi ad ℥vj. M.—A tablespoonful every three hours.
Useful to relieve heartburn and nausea.

XVI.—TONICS

Quininæ Sulphatis Mistura.

75. Recipe—Quininæ Sulphatis grana sexaginta, Acidi Sulphurici diluti drachmam cum semisse, Syrupi Aurantii, Tincturæ Aurantii ana drachmas quatuor, Aquæ ad uncias sex. Misce.
Signa—A dessertspoonful three times a day.

Glycerine and Dialysed Iron.

76. ℞ Liquor. Ferri. Dialys ℥i., Glycerini ℥ii. M.—A teaspoonful thrice daily.

Quinine and Gentian.

77. ℞ Ferri et Quininæ Citratis, Ext. Gentian, āā ℥ss. M.—To be divided into eighteen pills. One to be taken twice a day.

Iron, Hydrochloric Acid, and Calumba.

78. ℞ Tinct. Ferri Perchlor. ℥iss., Quin. Sulph. gr. lx., Acid. Hydrochlor. dil. ℥j., Tinct. Quassiæ ℥vi., Inf. Calumb. ad ℥vj. M. S.—A tablespoonful three times a day.

Iron, Calumba, and Glycerine.

79. ℞ Tinct. Ferri Perchlor. ℥ij., Tinct. Calumbæ ℥iij., Glycerini ℥ij., Aquæ ad ℥vj. M. S.—A tablespoonful three times a day.
Useful in anæmia, and sometimes also in phthisis.

Nitro-Muriatic Acid and Gentian.

79*a*. ℞ Acid. Nitro-Mur. dil. ℥ii., Tinct. Gentian. Co. ℥iiis., Decoct. Taraxaci ℥vi. M.—A tablespoonful thrice daily.

Strychnine and Nitric Acid.

80. ℞ Liquor. Strychninæ Hydrochlor. ʒj., Acid. Nitric. dil. ʒiss., Acid. Hydrochlor. dil. ʒiss., Tinct. Zingib. ʒiijss., Syrup. Croci ʒiij., Aquæ ad ʒvj. M. S.—A tablespoonful three times a day.

Useful in some spinal affections.

80*a*. ℞ Strychninæ Sulphatis gr. ½, Acidi Phosphor. dil. ʒvi., Syr. Aurantii ʒiss., Aquæ ad ʒii. M. S.—A dessertspoonful thrice daily in spinal irritation (Hammond).

Syrup of Iodide of Iron and Cod-Liver Oil.

81. ℞ Syrupi Ferri Iodidi ʒiij., Mucilag. Acaciæ ʒj., Ol. Morrhuæ ad ʒvi. M.—A tablespoonful three times a day.

Hypophosphite of Lime and Glycerine.

82. ℞ Calcii Hypophosphitis ʒj., Glycerini ʒii., Aquæ ʒiv. S.—A tablespoonful three times a day.

Hypophosphite of Lime and Syrup.

82*a*. ℞ Calcii Hypophosphitis ʒi., Syrupi ʒvj. M. S.—A tablespoonful thrice daily.

Iron and Gentian.

83. ℞ Ferri Sulphatis Exsicc., Ext. Gentian., āā ʒss. M.—Divide into twelve pills; one twice daily.

Citric Acid, Citrate of Iron, Bismuth, and Prussic Acid.

84. ℞ Ferri et Am. Citratis ʒiss., Acid. Citrici ʒvj., Aquæ ʒvj. Misce.

℞ Acid. Hydrocyanici dil. m. lxxij., Potass. Bicarb. ʒvj. Liq. Bismuth., Syrup. Aurantii, āā ʒiij. M.—A dessertspoonful of the contents of each, in a glass of water, thrice daily.

Recommended in dropsy from granular kidney.

Strychnine, Phosphorus, and Quinine.

85. ℞ Strychninæ gr. i., Ferri Pyrophosphatis, Quininæ Sulph. āā ʒi.; Acid. Phosph. dil., Syrup Zingiber., āā ʒij. M. S.—A teaspoonful three times a day in a little water.

Recommended in some nervous affections when strychnine is required.

Phosphorus.

86. ℞ Olei Phosphorat. ʒss., Mucilag. Acaciæ ʒj., Olei Bergamot. gtt. xl. M.—Twenty-five drops three times a day.

Useful in nervous affections requiring phosphorus.

Salicylate of Sodium Mixture.

87. ℞ Sodii Salicyl. ℥ij., Potass. Acetat. ℥iss., Aquæ ℥vj.
S.—A tablespoonful every three hours.
Recommended in rheumatic fever.

Digitalis and Iron.

88. ℞ Tincturæ Ferri Perchloridi ℥ii., Tincturæ Digitalis ℥ii., Aquæ ℥vss. M.—A tablespoonful twice or thrice daily (see p. 617).

Pil. Ferri (Blaud's Pills modified).

89. ℞ Ferri Sulph. gr. xxx., Potass. Carb. gr. xxx., Pulv. Tragacanth. gr. iii., Aq. q.s. Misce. Divide into eighteen pills.
S.—One thrice daily at first, and increased by one pill every day. Ultimately five pills thrice daily may be taken.[1]
In chlorosis and anæmia of girls previous to puberty.

Citrate of Iron and Ammonium, with Calumba.

90. ℞ Ferri et Ammon. Citrat. ℥i., Tinct. Calumbæ ℥iii., Aquæ Camph. ad ℥vi. M. S.—A tablespoonful thrice daily.
Useful tonic in kidney disease, etc.

Iron, Dilute Phosphoric Acid, Spirit of Lemon.

90*a*. ℞ Tinct. Ferri Perchlor. ℥iv., Acid. Phosphor. dil. ℥vi., Spiritus Limon. ℥ii., Syrupi ad ℥vi. M.
S.—A dessertspoonful in water thrice daily after meals.

Rhubarb and Pepsin.

91. ℞ Pulv. Rhei gr. iv., Pepsinæ gr. iij. M.
Useful in dyspepsia with flatulence. To be taken after meals.

Phosphate Mixture for Diabetes.

91*a*. Take of Bone Ash of Femur, gr. 1040; Light Calc. Magnesia, gr. 406; Bicarbonate of Potassium, gr. 900; Phosphate of Sodium, gr. 3520; Syrupy Phosphoric Acid, q.s.; Water, q.s. (1) Powder the Bone Ash finely, and add 4 ounces of the Syrupy Phosphoric Acid, previously diluted with the same bulk of water. Mix thoroughly and allow the mixture to stand six or eight hours; (2) Add to the Magnesia a sufficiency of water to make a mass, and a sufficiency of the phos-

[1] The addendum to the B. P. states in an unsatisfactory manner the dose as 1 to 4 pills.

phoric acid to form a solution. (3) Dissolve the phosphate of sodium and bicarbonate of potassium in 16 oz. of water, and add the solution of magnesia, and then sufficient phosphoric acid to make a clear solution. (4) Mix this solution with the Bone Ash and phosphoric acid, add water to form three pints, then filter the clear fluid. It must be made up by washing the filter to 64 oz.

℥i. in water after food.

Chlorate of Potassium, Iron, and Glycerine.

91*b*. ℞ Potass. Chlorat. ℥i., Tinct. Ferri Perchlor. ℥i., Glycerini ℥ii., Aquæ ad ℥vi. M.—Two tablespoonfuls every two hours in scarlet fever or suppurative tonsillitis.

Solution of Phosphorus.

91*c*. ℞ Phosphori gr. ss.—iss., Alcohol. Absolut. ℥ii. (to dissolve), Ess. Menth. Pip. ℥i., Glycerini ad ℥iv. M.—In spinal irritation, a teaspoonful after food.

Oxide of Zinc Pills.

91*d*. ℞ Zinci Oxidi gr. xxiv., Confectionis Rosæ, q.s. M.—Divide into xx. pills; one to be taken three times a day after meals.

In spinal irritation, ½ gr. of Ext. Nucis Vomicæ may be added to each pill.

Test for Diabetic Urine.

Fehling's Standard Solution is prepared according to the following prescription:—Sulphate of Copper, 90½ grains; Neutral Tartrate of Potash, 364 grains; Solution of Caustic Soda, sp. gr. 1·12, four fluid ounces; add water to make up exactly six fluid ounces. 200 grains of this solution are exactly decomposed by *one* grain of sugar.

The Ureameter.

To estimate the quantity of urea, the following apparatus is useful. The principle of the process depends on the evolution of nitrogen gas which ensues when urine comes in contact with hypobromite of sodium. The first step is to make a solution of caustic soda, which is done by taking of Caustic Soda 1 oz., Water 2½ oz. Measure of this solution, as per mark on bottle, minims 420; add 40 minims of bromine. Shake well and allow the mixture to cool thoroughly. We have now a solution of Hypobromite of Sodium.

Next, take of the urine to be tested, as per pipette, 65 minims, which place in a small tube. Insert this into the bottle containing the hypobromite of sodium solution. Cork, and read off the marking of the graduated tube.

Next, allow the urine and hypobromite of sodium to mix. The result is the evolution of nitrogen gas. When the decomposition is completed, the graduated index, after deducting the first from the last reading, will reveal the volume of nitrogen gas.

Dr. Dittmar, Professor of Chemistry, Technical College, Glasgow, has so constructed the index that each degree of it corresponds to one grain of urea per ounce in the urine. It is thus only necessary to measure the whole quantity of urine passed in the twenty-four hours, and then multiply that by what the index shows, after the evolution of nitrogen gas, to tell the quantity of urea excreted daily.

Thus, supposing the quantity of urine passed in twenty-four hours to be 50 ounces, and the number of grains per ounce of urine as read off to be 8, the total quantity of urea will be $50 \times 8 = 400$ grains.

The apparatus can be obtained from Mr. Hume, Lothian Street, Edinburgh.

The formula given by Mayer for detecting Quinine in the urine is, Water, 10; Corrosive Sublimate, 12·54; Iodide of Potassium, 49. A cubic centimètre of this solution precipitates a centigramme of Quinine, and the precipitate does not disappear; it is insoluble.

DETECTION OF PEPTONE

"If we test for albumen by the nitric acid and heat test, or by acetic acid and permanganate of potassium, and obtain negative results, we proceed by Hoffmeister's test for peptone. The urine is treated with neutral acetate of lead and filtered. The clear filtrate[1] is acidulated with hydrochloric acid, and phospho-tungstic acid is added until a precipitate ceases to form with it. The fluid is then filtered without delay. The precipitate consists of peptone combined with phospho-tungstic acid and various other substances (animal alkaloids, etc.) It is now washed on the filter with 5 parts of concentrated sulphuric acid in 100 of water, until the fluid which passes through is colourless. In this way the salts are got rid of. The precipitate, while still wet, is washed from the filter with as little

[1] This should amount to not less than 500 to 600 cc. in volume.

water as possible, and is received into a watch glass. Carbonate of Barium is added until the mixture is alkaline, and the latter is then placed on a water bath at boiling point and heated for ten or fifteen minutes, and the Biuret test is applied.

"Peptone is shown by the formation of a colour varying from bluish-red to violet, and varying in intensity according to the quantity present. If this be only a trace the resulting colour is of a dirty red or dull violet."—JAKSCH.

METHODS OF PREPARING BEEF TEA, MEAT JELLY, ETC.

Beef Tea.

1. 1 or 2 lbs. lean beef cut up into small squares; let it soak in enough cold water to cover it well, for three or four hours, with a pinch of salt.

Then boil it quickly for twenty minutes, and strain away the meat.

2. 1 lb. lean beef fresh killed; mince *very* fine *on a plate*, and put in one pint water.

Let it stand *one hour*.

Set it near the fire to warm gradually *one hour*, then let it boil only *two or three minutes*, and stand it to cool *one hour*, when the fluid is to be poured off.

3. 1½ lbs. beef cut into small bits, sprinkle salt on the beef, 1 quart water boiling, gently simmer (*not boil*) one hour, and run it through a cloth. To the same beef add one quart water, simmer two hours, strain it on to four tablespoonfuls of sago; boil till clear as jelly, then add by degrees to the first straining.

Meat Jelly.

1¼ lb. lean beef.
¼ lb. lean veal.
A good pinch of salt.

Cut up into small pieces, add salt, put into a white jar with *no* water. Place the jar, loosely covered by saucer, into a saucepan half full of water, and let it simmer for eight to ten hours. Strain through a damask napkin; replace the strained liquor into the jar, and the jar into the saucepan; simmer one hour longer; strain again and set to cool.

P.S.—If this does not jelly in a few hours a little of the best gelatine may be added.

Chicken Panada.

Boil a chicken till three parts ready, take off the skin, cut the white meat off when cold, and pound it, in a mortar, to a paste with a little good white stock. Boil gently a few minutes. It should be as thick as custard when done.

METHOD OF PERFORMING POST-MORTEM EXAMINATIONS[1]

BEFORE opening the body the external appearances are to be observed—the presence of injuries or marks of any sort, the state of the post-mortem rigidity, and the cadaveric lividity, as well as the degree of coldness of the body, are to be carefully noted.

Head.—It is better to begin by opening the head, for the condition of the blood-vessels in the meninges can thus be more accurately examined than if, the chest having been opened, the blood is permitted to flow out at the cut ends of the large veins. To open the head, make an incision across the vertex from ear to ear, quite down to the skull. In making this incision the most ready means of parting the hair is to cut the skin from one ear to the other, from within outwards with the back of the knife to the skull; and this preliminary cut having been made, it can be deepened by a second sweep of the knife. With the chisel, the scalp, including the periosteum, is now pushed forwards over the brow, and backwards over the occiput, giving room for the saw to pass round the skull in a horizontal plane about $\frac{3}{4}$ inch above the orbit, and $\frac{1}{2}$ inch above the occipital protuberance. The saw-cut should not go quite through the two tables; the inner one is to be cracked in the line of the saw-cut with the chisel and mallet, the former of which may then be used to prise the skull-cap off. In cases of injury to the head, it is better to carry the saw-cut quite through both tables all round, and then cut the brain clear through at that level with a long knife.

Split up the longitudinal sinus with fine scissors, and with a probe-pointed bistoury divide the dura mater all round along the edge of the skull and cut its attachment to the crista galli. Then pull the dura mater backwards, exposing the surface of the arachnoid. Now remove the brain from before backwards, taking care not to tear any part of it, and divide the spinal cord as low down as possible. Examine the base of the brain, remove the dura mater from the base of the skull, and examine the bone, opening the internal ear if necessary with the chisel.

The examination of the interior of the brain itself is begun by opening the lateral ventricles by two longitudinal incisions along the corpus callosum; after which the knife is laid parallel to the corpus callosum, and the brain is sliced laterally in such a way that each cut stops just short of the convex surface of the hemisphere. The third, fifth, and fourth ventricles may now be opened; and finally a series of closely-placed transverse incisions may be made across the corpora striata and optic thalami to expose their texture in every part. The medulla oblongata is split longitudinally, and a cut through each half of the cerebellum may be made.

Trunk.—With a strong knife an incision is made down the middle line of the trunk from the suprasternal notch to the pubes, opening the abdominal cavity. The soft parts are held back from the lower edge of the thorax, and an incision carried through the peritoneum along the lower costal cartilages, after which the dissection of the flesh from the front of the

[1] This "method" was written by the late Dr. Foulis, Pathologist to the Glasgow Royal Infirmary.

thorax can be done with long sweeping cuts. The costal cartilages are then cut half an inch from the anterior ends of the ribs, beginning with the second cartilage, and thence passing downwards to the lower margin of the thorax, the cut inclining outwards as it descends. In cutting these cartilages hold the knife with the handle level, so that as each cartilage is cut the edge of the knife may fall on the next cartilage and not plunge into the lung; but, in cutting the first costal cartilage, which must next be done, the knife is to be held perpendicularly with the edge towards the clavicle, and directed rather outwards to avoid the manubrium sterni. Then cut the sterno-clavicular and costo-clavicular ligaments by an incision curved from above downwards and outwards, and remove the sternum. Note the position of the heart, etc., and the state of the pleuræ and peritoneum, and open the pericardium, pinching up a part of it and cutting it horizontally. Having observed its contents, open the heart. This may be done *in situ* by two incisions along the anterior and posterior borders into the ventricles; or the heart may be removed, and afterwards opened by the incisions just mentioned, followed by a cut along each side of the septum ventriculorum from the apex into the pulmonary artery and aorta. The state of the valves, of the heart tissue, and of the ascending arch of the aorta can then be studied. The lungs may now be removed and divided by one long cut from apex to base. The bronchi are split up with scissors, and the trachea and larynx similarly split up with the knife. If desired, the great median incision first described may be continued up to the chin, and the tongue, fauces, larynx, and upper half of the gullet can be removed bodily and examined in detail afterwards.

Now divide the diaphragm so as to let the liver fall back into the chest, open the stomach (if this has not already been done), and clean out its contents. Then examine the spleen, kidneys, ureters, bladder, and urethra, not forgetting the supra-renal capsules. The state of the gall-bladder and its duct must now be ascertained. For this purpose carry the incision in the stomach along the duodenum, past the orifice of the ductus communis, wipe the surface of the mucous membrane, and putting gentle pressure on the gall-bladder, note whether the bile flows freely from the duct. Then examine the portal vein and remove the liver, which may be divided by long transverse incisions. To examine the bowels, remove them from the body, separating them with the knife along the edge of the mesentery as close as possible to the gut. Split the gut from end to end with the gut scissors, and examine the mucous surface under a stream of water.

The mesenteric glands, aorta, and pancreas may next be looked at, and then the front of the spine should be cleared of all soft tissue. Any lateral curvature or exostosis will thus come into view, and the spinal canal can then more readily be opened. This may be done from before or behind. If from before, the bodies of the vertebræ are to be separated by saw or chisel; if from behind, the cadaver must be laid prone, a longitudinal incision made from the occiput to the sacrum, and the soft tissues removed from the spinal arches, which are then to be cut with the saw and forceps.

Weight of Adult Organs.

	Male.	Female.
Brain	49 oz.	44 oz.
Heart	10 oz.	9 oz.
Lungs { right	24 oz.	17 oz.
Lungs { left	21 oz.	15 oz.
Liver	53 oz.	45 oz.
Spleen	4 to 10 oz.	4 to 10 oz.
Kidney	4½ oz.	4 oz.

GLOSSARY

ACARUS SCABIEI.—From ἀ neg., κείρω to cut, and *scabere* to scratch.—The acarus, whose presence gives rise to scabies, a contagious disease of the skin attended with great itching.

ACNE.—From ἀκμή strength.—An eruption of hard, distinct, and inflamed tubercules appearing on the forehead, temples, etc.

ÆGOPHONY.—From αἴξ a goat, and φωνή voice.—A sound similar to the bleating of a goat. Heard through the stethoscope, when applied to the inferior angle of the scapula, in cases of pleurisy with effusion.

ALOPECIA AREATA.—From ἀλώπηξ a fox (a common affection of this animal), and *area* an open space.—Loss of hair, leaving little circular or oval bald patches.

ALTERATIVES.—From *altero* to vary.—Medicines which promote a salutary effect on the functions of the system without causing apparent evacuations.

AMENORRHŒA.—From ἀ neg., μήν a month, ῥέω to flow.—A suppression of the monthly discharge.

AMPHORIC.—From ἀμφορεύς a Greek wine-vessel.—In auscultation, a sound similar to that produced by blowing into a decanter a little distance from the aperture.

AMYLOID.—From ἀ neg., μύλη a mill, *i.e.* not ground in a mill.—Resembling starch. If iodine be applied to an amyloid organ, the affected portions change to a brown colour, but, on the subsequent application of sulphuric acid, a bluish tint is produced.

ANÆSTHESIA.—From ἀ neg., αἰσθάνομαι to feel. Loss of sensation.

ANASARCA.—From ἀνά through, σάρξ flesh.—A collection of serum in the integuments of the body, characterised by pitting on the application of pressure.

ANEURYSM.—From ἀνευρύνω to make wide.—A swelling produced by the dilatation of an artery.

ANGINA PECTORIS.—From ἄγχω to strangle, and *pectus* the breast.—A dangerous affection, characterised by a sense of suffocation, severe pain at the chest, and great anxiety.

ANTHELMINTICS.—From ἀντί against, ἕλμινς a worm.—Medicines which expel worms from the intestines.

ANTIPYRETICS.—From *ἀντί* against, *πυρετός* fever.—Remedies used for allaying fever.

APHASIA.—From *ἀ* neg., *φάσις* speech.—A partial or complete loss of the power of speech, due to cerebral causes.

APHONIA.—From *ἀ* neg., *φωνή* voice.—Loss of voice.

APHTHA.—From *ἅπτω* to fix upon.—Thrush. Small round white vesicles affecting lips, mouth, and intestinal canal.

APOPLEXY.—From *ἀπό* of the cause, *πλήσσω* to strike.—Loss of sensation and voluntary motion, whilst the respiration and heart's action are slightly, or not at all, affected.

ARCUS SENILIS.—From *arcus* anything arched or curved, and *senilis* aged.—An opaque ring round the margin of the cornea, observed in old people.

ASCARIDES.—From *ἀσκαρίζω* I leap.—A genus of intestinal worms.

ASCITES.—From *ἀσκος* a leather sack or wine-skin.—A collection of serous fluid within the peritoneum.

ASTHMA.—From *ἀσθμάζω* to gasp for breath.—A sensation of suffocation, or constriction of the chest with cough and expectoration.

ATROPHY.—From *ἀ* neg., *τρέφω* to nourish.—Progressive wasting of the whole or a portion of the body, caused by decrease in size or number of its histological elements.

BOTHRIOCEPHALUS LATUS.—From *βοθρίον* a small pit, *κεφαλή* a head.—The broad tapeworm.

BRONCHIECTASIS.—From *βρόγχος* the windpipe, *ἔκτασις* a stretching out.—Dilatation of the bronchi.

BRONCHOCELE.—From *βρόγχος* the windpipe, *κήλη* swelling.—An inaccurate term for an enlargement of the thyroid gland.

BRONCHOPHONY.—From *βρόγχος* the windpipe, *φωνή* voice.—A distinct, but not loud, sound of the voice heard when the stethoscope is applied to the chest in cases of pneumonia, phthisis, and other consolidations.

BRUIT DE POT FÊLÉ.—Sound of a cracked vessel, heard sometimes on percussing over a cavity in the lung, when it is near the surface and communicates with an open bronchus.

CACHEXIA.—From *κακός* evil, *ἕξις* habit.—A depraved condition of the body, which is usually the result, and not the cause, of disease.

CARDIALGIA.—From *καρδία* the heart, *ἄλγος* pain.—A burning pain referred to the stomach. Heartburn.

CASEATION.—From *caseus*, cheese.—A pathological process observed in tuberculosis, when the inflammatory product becomes yellow, friable, and dry.

CATAMENIA.—From *κατά* answering to, *μήν* a month.—The menstrual discharge of females.

CATARRH.—From *καταῤῥέω* to flow down.—Inflammation of, and discharge of fluid from, a mucous membrane. Generally

used to denote a common cold affecting the nose (Coryza), the frontal sinuses (Gravedo), and trachea and bronchial tubes (Bronchitis).

CATHARTICS. — From *καθαίρω* to purge. — Medicines which increase the number of intestinal evacuations.

CAVERNOUS RESPIRATION.—From *caverna* a cave, grotto.—A hollow sound heard during auscultation, in dilated bronchi and diseases causing excavation in the lung tissue. Tracheal respiration.

CHLOASMA.—From *χλοάζω* to be of a pale light green.—An eruption of light yellowish-brown patches on the chest and abdomen. Dark circles round the eyes.

CHLOROSIS.—From *χλωρός* green—generally pale, pallid.—Green sickness. Peculiar to young girls suffering from disordered or arrested menstrual flow. There is frequently a green tint of the complexion.

CHOREA.—From *χορεία* a dancing.—A disease attended with erratic movements, grimaces, twitchings, and gesticulations of an involuntary character.

CIRRHOSIS.—From *κιῤῥός* yellow.—An increase of connective tissue in the liver or kidneys, which may be so excessive as to absorb or destroy the natural structure by pressure. In cirrhosis of the liver, the pale colour is due to the large amount of yellow pigment in the secreting cells; the liver is also smaller and puckered, producing the hobnailed condition.

CLONIC.—From *κλόνος* any violent motion, tumult.—A term applied to convulsive movements in which contractions and relaxations alternate.

CONDYLOMATA, pl. of Condyloma.—From *κόνδυλος* a knuckle.—Indolent, wart-like protuberances about the genital organs and anus.

CORYMBOSE. — From *κόρυμβος* a cluster of fruit or flowers terminating in a flat plane.

CORYZA.—From *κάρα* the head, and *ζέω* to boil.—A mucous, ropy discharge from the nostrils, caused by inflammation of the Schneiderian membrane.

CREPITATION.—From *crepito* to crackle.—A sound heard in the first stage of pneumonia, prior to consolidation, and in the third stage (resolution). It is also manifest in acute capillary bronchitis.

CUTIS ANSERINA.—*Cutis* skin, *anser* a goose.—A condition of the skin observed in the early stage of fever, and in various nervous affections, and resembling the skin of a plucked goose.

CYANOSIS.—From *κύανος* blue.—Lividity or duskiness of the face. Observed in affections interfering with the entrance of air into the lungs.

CYNANCHE PAROTIDEA.—From *κύων* a dog, *ἄγχω* to choke;

παρά belonging to, οὖς the ear.—Mumps. Inflammation of the parotid gland.

CYSTICERCUS.—From κύστις the bladder, κέρκος a tail.—A genus of the Entozoa of the family of the hydatids. The tailed bladder-worm.

DESQUAMATION.—From *desquamo* to scale off.—Separation of the epidermis in the form of scales.

DIABETES.—From διά through, βαίνω pass.—Great increase of the secretion of urine.

DIAPHORETICS.—From διά through, φορέω to carry.—Remedies which promote perspiration.

DIATHESIS.—From διατίθημι to arrange, dispose.—A morbid tendency. A peculiar predisposition to certain diseases.

DIPHTHERIA.—From διφθέρα a skin or membrane.—An epidemic disease of the throat, consisting of the formation of false membranes, which appear on uvula and palate, tonsils and pharynx, extend into pharynx and larynx, and are at first white, but afterwards become darker. These diphtheritic patches separate by sloughing.

DIPSOMANIA.—From δίψα thirst, μανία rage.—An insatiable desire for alcohol, observed in habitual drunkards.

DIURETICS.—From διά through, οὐρέω to pass urine.—Medicines which promote an increased flow of urine.

DYSENTERY.—From δύς with difficulty, ἔντερον bowel.—Inflammation and ulceration of the mucous membrane of large intestine and rectum, attended with griping and mucous and bloody stools.

DYSPEPSIA.—From δύς with difficulty, πέπτω or πέσσω to soften, digest.—A disordered condition of the functions of the stomach. Indigestion.

DYSPNŒA.—From δύς with difficulty, πνέω to breathe.—Difficult, laboured, obstructed breathing.

ECCHYMOSIS.—From ἐκχυμόω to pour out.—A blue or black discoloration from an extravasation of blood into the areolar tissue.

ECHINOCOCCI.—From ἐχῖνος hedgehog, κόκκος a berry.—Immature tapeworms or hooklets, found in hydatid cysts, most commonly in the liver.

ECTHYMA.—From ἐκθύω to break out.—Skin disease characterised by large pustules and inflammation of a severe type.

ECZEMA.—From ἐκζέω to boil up.—An inflammatory disease of the skin, with formation of vesicles, which, from irritation or other causes, may become pustules.

EMBOLISM.—From ἐμβόλη a wedge or plug.—The obstruction of a blood-vessel by a fibrinous concretion, which has been detached from the heart or one of the vessels.

EMPHYSEMA.—From ἐμφυσάω to inflate.—1. Infiltration of air into the interlobular areolar tissue. 2. Dilatation of air-cells, which assume the size of hemp-seeds.

EMPYEMA.—From ἐν within, πύον pus.—A collection of pus within the cavity of the pleura.

ENCEPHALITIS.—From ἐγκέφαλος brain, terminal *-itis*.—Inflammation of the brain and its membranes.

ENDEMIC.—From ἐν amongst, δῆμος people.—Referring to diseases peculiar to certain localities.

ENDOCARDITIS.—From ἔνδον within, καρδία the heart, terminal *-itis*.—Inflammation of the membrane which lines the interior of the heart.

EPIDEMIC.—From ἐπί upon, δῆμος people.—Applicable to diseases which attack large numbers simultaneously.

EPILEPSY.—From ἐπιλαμβάνω to seize, attack.—Sudden and complete unconsciousness, with a series of convulsive movements.

ERUCTATION.—From *eructo* to belch.—Expulsion of wind from the stomach by the mouth.

ERYTHEMA.—From ἐρυθαίνω to redden.—Arises from some derangement of the system, and consists of a mere redness of the skin, not extending to the cellular tissue.

ETIOLOGY.—From αἰτία cause, λόγος discourse.—An account of the causes of disease.

EXACERBATION.—From *exacerbo* to make angry.—An increase of the strength and fury of the symptoms of a disease.

EXANTHEMATA.—From ἐξανθέω to break out, to bloom.—Diseases of the skin, consisting of an eruption of red patches, which disappear transiently under pressure.

EXOPHTHALMIC GOÎTRE.—From ἐξ out, ὄφθαλμος the eye.—Protrusion of the eyeball, accompanied by goître.

EXPECTORANTS.—From *expectoro* to discharge from the chest.—Medicines which facilitate the removal of secretions collected in the chest.

FEBRIFUGE.—From *febris* fever, *fugo* to drive away.—A medicine which possesses the power of diminishing the severity of fever.

FISTULA.—A pipe, tube, reed.—A passage with narrow opening, the result, generally, of ulcer or abscess.

FOMITES, pl. of *fomes*, touchwood, tinder.—Porous substances which absorb and retain contagious effluvia, as woollen clothing, cotton materials, etc.

FREMITUS, murmuring, growling.—Vocal fremitus is a vibration communicated to the hand when placed on the chest whilst the patient is speaking. It is absent or diminished in pleuritic effusion, and increased in pulmonary consolidation.

GASTRALGIA.—From γαστήρ stomach, ἄλγος pain.—A sensation of pain in the stomach of a burning character.

GASTRODYNIA.—From γαστήρ stomach, ὀδύνη pain.—Cramp or spasmodic pain in the stomach.

GASTROTOMY.—From γαστήρ stomach, τέμνω to cut.—The operation of opening the stomach.

GLYCOSURIA.—From γλυκύς sweet, οὖρον urine.—Sugar in the urine.

GRAVEDO.—From *gravis* heavy.—Inflammation of the membrane lining the frontal sinuses.

GUMMATA.—From *gumma* an elastic tumour containing a substance like gum.—Small, firm, yellow-whitish tumour surrounded by a capsule formed of degenerated tissues. Characteristic of syphilis.

HÆMATEMESIS.—From αἷμα blood, ἐμέω to vomit.—Vomiting of blood from the stomach.

HÆMATINURIA.—From *hæmatin* the red colouring matter of the blood, οὖρον urine. Dark-coloured urine, containing no blood, but merely the colouring-matter of the blood.

HÆMOPTYSIS.—From αἷμα blood, πτύω to spit.—Bleeding from the lungs.

HÆMORRHAGE.—From αἷμα blood, ῥήγνυμι to break forth.—Bursting forth or discharge of blood.

HEMIPLEGIA.—From ἥμισυς half, πλήσσω to strike.—Paralysis affecting one side of the body.

HEPATISATION.—From ἧπαρ the liver.—A term applied to the lungs when so inflamed as to be impervious to air, the structure assuming a liver-like appearance.

HERPES.—From ἕρπω to creep.—A skin disease consisting of small vesicles upon inflamed bases.

HYALINE.—From ὕαλος glass.—A transparent colourless substance.

HYDATIDS.—From ὕδωρ water.—Cysts filled with a limpid fluid, floating in which are the immature tapeworms.

HYDRAGOGUES.—From ὕδωρ water, ἄγω to expel.—Medicines which cause watery evacuations.

HYDROCEPHALUS.—From ὕδωρ water, κεφαλή the head.—A collection of water within the head.

HYDRONEPHROSIS.—From ὕδωρ water, νεφρός the kidney.—Dropsy of the kidney.

HYDROPHOBIA.—From ὕδωρ water, φοβέω to fear.—A disease caused usually by the bite of a rabid animal and consequent absorption of the rabietic poison.

HYPERTROPHY.—From ὑπέρ above, increase, τρέφω to nourish.—Excessive growth or enlargement of a part, caused by increase in size or number (or both) of tissue elements.

HYPOCHONDRIASIS.—From ὑπό under, χόνδρος cartilage.—Morbid sensibility, mental alienation. Probably derives its name from an uneasy feeling experienced in the hypochondriac regions.

HYSTERIA.—From ὑστέρα the womb.—A nervous disorder confined almost entirely to susceptible females, consisting of a morbid imagination, peculiar deceptions, and amorous excitement.

Ichthyosis.—From *ἰχθύα* skin of a fish.—A hard, dry, scaly, non-contagious disease of the skin.

Idiopathic.—From *ἴδιος* peculiar, separate.—A spontaneous or primary disease. Not dependent upon another.

Impetigo.—From *impeto* to attack.—A pustular disease of the skin, forming thick yellowish incrustations.

Insolatio.—From *in*, and *sol* the sun.—An affection due to the direct action of the sun's rays. Sunstroke.

Interstitial.—From *inter* between, *sto* to stand.—By some called fibroid. Pertaining to an increase and hardening of the connective tissue.

Intussusception.—From *intus* within, *suscipio* to receive.—Introduction of one part of the bowel into another, just as the finger of a glove is pulled within itself.

Laryngismus Stridulus.—From *λαρυγγίζω* to bawl, *stridulus* a hissing sound.—Spasm of the muscles of the glottis, usually nocturnal, preventing the entrance of air, and giving rise to hoarse, croupy cough. False croup.

Laryngitis.—From *λάρυγξ* the windpipe, terminal *-itis*.—Inflammation of the larynx.

Leucocythæmia.—From *λευκός* white, *κῦτος* a cell, *αἷμα* blood.—A superabundant development of the colourless corpuscles of the blood. White-cell blood.

Lichen.—From *λειχήν* moss.—A skin disease in which the papules are distinct or arranged in clusters. Very irritating and obstinate.

Locomotor Ataxy.—From *ἀ* neg., *τάσσω* to order.—An absence of co-ordination in the movements of the muscles.

Lupus.—From *lupus* the wolf.—A spreading, corroding, tuberculous disease.

Lysis.—From *λύω* to dissolve.—The gradual diminution and termination of a fever without critical symptoms.

Macula.—From the Latin *macula*.—A permanent discoloration of some portion of the skin, sometimes associated with alteration of its texture. It is not dependent on any disease of the constitution.

Marasmus.—From *μαραίνω* to waste or pine away.—Progressive wasting.

Metallic Tinkling.—A sound like that caused by striking glass or metal with a pin. A pathognomonic symptom of pneumothorax with effusion.

Meningitis.—From *meningium*, terminal *-itis*.—Acute inflammation of the pia mater and arachnoid.

Myalgia.—From *μῦς* a muscle, *ἄλγος* pain.—Muscular soreness, stiffness, or pain. Cramp.

Myelitis.—From *μυελός* marrow, terminal *-itis*.—Inflammation of the spinal cord.

NEPHRALGIA.—From *νεφρός* the kidney, *ἄλγος* pain.—Pain and neuralgia in the kidney.

NEPHRITIS.—From *νεφρός* the kidney, terminal *-itis*.—Inflammation of the kidney.

NUMMULAR.—From *nummula* a little coin.—Applied to sputa lying flat at the bottom of a vessel, and having the appearance of small coins.

ŒDEMA.—From *οἰδέω* to swell.—Dropsical swelling, from accumulation of serous fluid in subcutaneous areolar tissue.

OIDIUM ALBICANS.—From *ὠόν* an egg, *εἶδος* resemblance.—A vegetable parasite, seen on the mucous membrane of cheek and throat as white spots and patches.

OPISTHOTONOS.—From *ὄπισθε* behind, *τείνω* to stretch.—Spasm of the neck, back, and loins, causing an arch-like appearance of the body.

OXYURIS.—From *ὀξύς* sharp, *οὐρά* a tail.—Small thread-worm.

PARACENTESIS.—From *παρά* by the side, *κεντέω* to stab.—The operation of removing fluid from a cavity by tapping.

PARALYSIS.—From *παραλύω* to relax or disable.—Diminution or total loss of voluntary motion, or sensibility, or of both.

PARAPLEGIA.—From *παραπλήσσω* to strike partly.—Palsy affecting the lower half of the body.

PARESIS.—From *παρίημι* to unloose, relax.—Partial paralysis, consisting of a slight inability of movement.

PATHOGNOMONIC.—From *πάθος* suffering, sickness, *γιγνώσκω* to perceive.—Applied to the distinguishing symptom or symptoms of a disease.

PECTORILOQUY.—From *pectus* the breast, *loquor* to speak.—The sound of the voice heard during auscultation, which appears to be transmitted directly from the chest into the ear.

PERICARDITIS.—From *περί* about, *καρδία* the heart, terminal *-itis*.—Inflammation of the sero-fibrous membrane covering the heart.

PERITONITIS.—From *περιτείνω* to stretch all round, terminal *-itis*.—Inflammation of the serous membrane lining the cavity of the abdomen.

PERITYPHLITIS.—From *περί* around, *τυφλός* blind, terminal *-itis*.—Inflammation of the areolar tissue which connects the psoas and iliacus muscles with the cæcum.

PETECHIA.—From *petechio* a flea-bite.—A small red or purplish spot, in shape and colour similar to a flea-bite, and due to subcutaneous hæmorrhage.

PHOTOPHOBIA.—From *φῶς* light, *φόβος* fear.—Aversion to and intolerance of light.—Found in certain stages of meningitis, in measles, typhus, and many diseases of the eye.

PHTHISIS.—From *φθίω* to pine or waste away.—Progressive emaciation. Consumption of the lungs. Decline.

PLEURISY, or *Pleuritis*.—From *πλευρά* the side, terminal

-itis.—Inflammation of the serous membrane which lines the walls of the chest, and is reflected upon each lung.

PLEURODYNIA.—From πλευρά the side, ὀδύνη pain.—Pain seated in the walls of the chest, and ordinarily in the intercostal nerves.

PLEXIMETER.—From πλήσσω to stride, μέτρον a measure.—An ivory plate used in mediate percussion of the chest.

PNEUMONIA.—From πνευμονία a disease of the lungs.—Acute inflammation of the substance of the lung.

PNEUMOTHORAX.—From πνεῦμα air, θώραξ the chest.—A collection of air in the pleural cavity. If serum also present, Hydropneumothorax ; if effusion purulent, Pyopneumothorax.

PODAGRA.—From πούς the foot, ἄγρα seizure.—Gout situated in the joints of the foot.

PROPHYLACTIC.—From πρό before, φυλάσσω to avoid.—The preventive treatment of disease.

PRURIGO.—From *prurio* to itch.—A papular eruption, attended with severe itching.

PSORIASIS.—From ψώρα itch, mange.—A disease of the skin characterised by patches of rough scales.

PTOSIS.—From πτόω to fall. A falling of or inability to raise the upper eyelid.

PUERPERAL.—From *puer* a child, *pario* to bring forth.—Relating to women recently delivered.

PURPURA.—From πορφύρα the purple fish.—Purple spots and patches on the skin from extravasation, due to a morbid condition of the blood and capillary vessels.

PYÆMIA.—From πύον pus, αἷμα blood.—Contamination of the blood from absorption of pus.

PYELITIS.—From πύελος a tub, trough, terminal *-itis.*—Inflammation of the pelvis, infundibula, and calyces of the kidney.

PYROSIS.—From πυρόω to burn.—A disease consisting in a hot sensation in the stomach and copious eructation of thin, watery, acid, or insipid fluid.

PYTHOGENIC.—From πύθω to rot, γεννάω to generate.—A term applied to typhoid, gastric, or enteric fever.

RABIES.—From *rabio* to be furious.—A disease of dogs and other animals, which, if implanted by means of the saliva into the human system, produces Hydrophobia.

RÂLES.—From *râler* to rattle in the throat.—Liquid sounds produced by the air passing through mucous or other fluids.

RESOLVENTS.—From *resolvo* to relax, undo. — Substances possessing the power of promoting the resolution of tumours.

RHONCHUS.—From ῥόγχος a rattling sound in the throat.—*Sonorous* rhonchus is a dry deep-toned sound produced by obstruction to the tide of air in a large bronchial tube. In the smaller tubes the pitch is higher, and whistling, hissing sounds are heard, called *sibilant* rhonchi.

ROSEOLA.—Diminutive of *rosa*, a rose.—An efflorescence of transient patches of redness. Non-contagious.

RUBEOLA.—From *rubeo* to blush.—A disease combining certain symptoms of scarlatina with symptoms resembling those of measles.

RUPIA.—From *ῥύπος* dirt, uncleanness.—A non-contagious eruptive disease characterised by flat vesicles, which are succeeded by dark and rough crusts.

SARCINA VENTRICULI.—From *σάρκινος* fleshy.—A microscopic cryptogamous plant, found in the contents of the stomach in pyrosis.

SCABIES.—From *scabo* to scratch.—A contagious cutaneous disease attended with severe itching.

SCIATICA.—From *ἰοχίον* the hip.—Pain in the sciatic nerve.

SCLEROSIS.—From *σκληρός* hard, tough.—An increase of connective tissue, which may destroy the natural structure by pressure.

SCROFULA.—From *scrofa* a sow.—A morbid state of the system revealed by chronic swelling and suppuration of the absorbent glands, etc.

SEPTICÆMIA.—From *σιήπω* to rot, *αἷμα* blood.—Putrid infection. A morbid state of the blood, due to the presence of bacteria, *i.e.* rod-like microscopic bodies.

SEQUELÆ.—From *sequor* to follow.—Morbid affections left as the result of a disease.

SHINGLES.—From *cingulum* a girdle.—The popular name for Herpes zoster, a vesicular disease which compasses half the circumference of the body.

STENOSIS.—From *στενόω* to make narrow.—Contraction of a vessel.

STERCORACEOUS.—From *stercus* excrement.—A term applied to fæcal vomiting.

STOMATITIS.—From *στόμα* a mouth, terminal *-itis*.—Inflammation of the mouth, which may be parasitic, vesicular, ulcerative, or gangrenous.

SUBSULTUS TENDINUM.—From *subsulto* to leap.—An involuntary twitching of the tendons, generally observable at the wrist. Evidence of great cerebral irritability.

SUDAMINA.—From *sudo* to sweat.—Small transparent vesicles which appear in numbers upon the skin in diseases accompanied by sweating.

SYCOSIS.—From *σῦκον* a fig.—An eruption of inflamed tubercles clustering about the beard and scalp. Ringworm of the beard.

SYNCOPE.—From *συγκόπτω* to knock to pieces.—Partial or complete suspension of respiration and the action of the heart. Sudden prostration.

Syphilis.—From *σύν* with, *φιλέω* to love.—An infectious disease communicable usually during coition.

Tabes.—From *tabeo* to decay.—Emaciation, usually the result of tubercular degeneration.

Tænia.—From *ταινία* a band or ribbon.—The tapeworm.

Tenesmus.—From *τείνω* to stretch, to strain to the utmost.—A painful desire to go to stool, with great straining.

Thrombosis.—From *θρόμβος* a clot of blood.—Partial or complete obstruction of a vessel by a morbid product formed at the occluded spot.

Tinea Circinata.—From *tinea* a gnawing worm, *circinatus* to be compassed about.—A contagious and parasitic disease attacking the general surface of the body, and characterised by rings, spreading from a centre.

Tinea Decalvans.—From *decalvo* to make bald.—Falling-off of the hair, leaving little circular or oval bald patches.

Tinea Favosa.—From *favus* a honeycomb.—This parasitic disease affects the scalp, and the hairs are found to pierce a small, dry, cup-shaped, yellow scab.

Tinea Tonsurans.—From *tondeo* to shave.—A disease of the scalp, in which are present patches of baldness, with scaly eruption.

Tinea Tricophytina.—From *θρίξ* the hair, *φυτόν* a vegetable.—A vegetable parasite affecting the scalp, the hairy part of the face, or any portion of the skin, producing ringworm.

Tinea Versicolor.—From *verso* to turn, *color* colour.—A vegetable parasitic disease marked by the presence of yellow-coloured patches on the chest and abdomen, and covered with small scales.

Tonic Spasm.—From *τείνω* to stretch.—Referring to rigid contraction of the muscles without relaxation.

Tophi, pl. of *tophus* or *tofus*, volcanic rock.—Chalk-stones. Concretions of urate of soda with animal matter found in the joints of gouty subjects.

Trichina Spiralis.—From *θρίξ* a hair, *σπεῖρα* anything wound round.—A species of entozoa infesting the voluntary muscles.

Tuberculosis.—Diminutive of *tuber* elevation or excrescence.—A morbid condition distinguished by small nodular lesions found in the organs and tissues, and by the presence of a special bacillus.

Tympanites.—From *τύμπανον* a drum.—Accumulation of wind in the bowels, marked by spherical projection of the abdomen, and increased resonance on percussion.

Typhlitis.—From *τυφλός* blind, terminal *-itis*.—Inflammation of the cæcum.

Typhoid.—From *τυφόω* to make dull or restless, *εἶδος* resem-

blance.—A slightly contagious fever, distinguished by increased vascularity of Peyer's glands, followed by ulceration.

Typhus.—From τυφόω to make dull or restless (or τῦφος smoke).—A continued contagious fever marked by great prostration and mental disturbance.

Uræmia.—From *urea*, and αἷμα blood.—A condition of urea in the blood, which acts as a poison to the nervous centres.

Urticaria.—From *urtica* a nettle.—An affection distinguished by an eruption of wheals, resembling the elevations produced on the skin by the stings of nettles.

Varicella, chicken-pox.—Diminutive of *variola*.—A mild eruptive disorder characterised by transparent vesicles of the size of a pea, and appearing in successive crops.

Variola.—From *varius* spotted.—A contagious disease marked by fever and an eruption passing through papular, vesicular, and pustular stages. Upon shrinking of the pustules scabs are formed. Small-pox.

Vibices, pl. of *vibex* the mark of a stripe.—Large purple spots appearing under the skin, and found in purpura, scurvy, small-pox, typhus, and hepatic and splenic diseases.

Zymotic.—From ζύμη leaven, yeast.—Zymotic diseases are those which depend on some morbid poison acting on the organism in the manner of a ferment. They are contagious, febrile in character, and rarely attack the same person more than once. Zymotic diseases are—small-pox, chicken-pox, typhus fever, typhoid fever, scarlet fever, the plague, measles, hooping-cough, and mumps.

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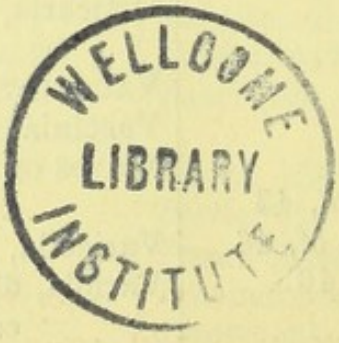

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