The student's textbook of the practice of medicine / by Angel Money.

THE STUDENT'S TEXTBOOK

OF THE

PRACTICE OF MEDICINE

By the same Author.

TREATMENT OF DISEASE IN CHILDREN: Including the Outlines of Diagnosis and the Chief Pathological Differences between Children and Adults. Crown 8vo, 10s. 6d.

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THE

STUDENT'S TEXTBOOK

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PRACTICE OF MEDICINE

BY

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PREFACE.

THE author has attempted to produce a very concise book of modern medicine which may, he hopes, prove useful to those who are beginning the study of medicine, to those who are preparing for examination, and to practitioners who have no time or inclination to peruse treatises. To give a right conception of disease and its treatment has been more the writer's aim than to state all that has been written about it. Subjects which are fully treated in works on surgery or general pathology find but scant account in this book.

The author's best thanks are due to Dr. John F. Farrar for the preparation of the copious index.

24 HARLEY STREET, LONDON, W.
March, 1889.

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ERRATA.

Page 8, last paragraph, first line, *for* ichæmia *read* ischæmia.
Page 22, first paragraph, *for* euthanasia *read* euphoria; *for* dysthanasia *read* dysphoria.
Page 47, first paragraph, *for* 20 drops *read* 40 drops or more every four hours.
Page 61, "head-line," *for* Thorax *read* Anthrax.
Page 91, line four from top, *for* arms *read* anus.
Page 97, *for* dissecans *read* desiccans.
Page 168, line 18 from bottom, *read* but a thrill is very rare.
The accent over *foie gras* on page 242 is an error.

MEDICINE.

INTRODUCTION.

Definition of Health and Disease.—The term Disease is employed to contrast with the term Health. Both terms have this condition in common; that they do not signify definite hard and fast states, or processes. A state is something fixed, a process is ever changing, and constructed therefore of a series of states. So health is an ever-changing process, but the changes do not go beyond certain bounds, or if the variations do transcend these certain limits we must call the process disease, and we say that a morbid instead of a healthy process is at work. For instance, if the temperature of the body of any individual exceeds 99°, we say that this is abnormal, and so if it descends below 97·8°, we regard it as subnormal, but any number between these figures would be spoken of as normal, because, so far as we know, such a temperature does not tend to interfere with enjoyment or shorten existence. These definitions appear to be very simple, but only those who have studied the subject will be able to appreciate the enormous, though theoretical, difficulties which beset a proper definition of health and disease.

The difficulty is not lessened, but actually increased, when we remember that a standard by which we judge whether health or disease is present, cannot with any degree of consistency be erected. It is the custom of the mind to

compare every phenomenon with some other phenomenon, and to test the one by the other; we, as doctors, have in our minds some ideas of health, and when we meet with other facts we compare them with our previous ideas. It is impossible for us to do more than say whether they are alike or whether they differ, and to what degree or extent. A man presents himself for examination, and wishes to know whether he is in good health. We find nothing inconsistent with our ideas of health, except that the complexion is very dark or that his pulse is very slow. That is, we discover nothing unusual except such and such a circumstance which is decidedly extraordinary. Are we to regard this dark skin or that slow pulse as indicative of some morbid process proceeding in the body, and yet not revealing itself by any other signs? As a matter of fact, the mere presence of a dark skin or a slow pulse would not make us believe any such thing. Repeated observation may prove that this skin, or that pulse, has always been the same in the same individual. We do not say that he is unhealthy or diseased, but that he has an *idiosyncrasy*. And yet compared with the bulk of the inhabitants of the world he is *abnormal* though not diseased. He is not diseased because neither the skin nor the pulse conduce to shorten life or interfere with the *bien être* of the individual. And yet these tests are not sufficient wherewith to judge whether disease is, or is not, present. A tumour in the brain, or elsewhere, *may* neither interfere with enjoyment nor abbreviate life, and yet it cannot but be regarded as a sign of disease.

Section I.

CAUSATION OF DISEASE.

It is wrong to think that one cause only is operative in the production of disease. There are instances in which but one agent seems to be at work, as for example in the acute specific fevers; but in reality this is not so, for the virus must often enter the body of an individual without giving rise to any morbid process. From this fact alone it is clear that other causes, besides the chief cause must be acting and co-operating to develop the disease. Hence we distinguish exciting or obvious causes from predisposing or secondary causes. In scarlatina it is usually necessary for the individual to be young, not to have had the disease before, and to be exposed to the scarlatinal poison. The last mentioned is the exciting cause, the age and the not having had the disease previously would be spoken of as predisposing causes.

What has just been remarked holds good, not only of actual diseases, but also of the signs, symptoms or modes of manifestation of disease. For symptoms may be present when their causes are present as they will certainly be absent when the conditions on which they depend are wanting. Hence we may see how in some cases of phthisis, cough or expectoration may be wanting altogether for a long period of time. In such cases, it is incumbent on us to suppose that some conditions, on which cough and expectoration are dependent, are absent or else suppressed by some other circumstance. And in the rational treatment of symptoms, the problem is to find out the conditions on which the symptom depends. As a rule,

this is not difficult, and then rational treatment will suggest the removal of one or more of the causal factors, and thus our patient may be benefitted, and the objectionable symptom caused to disappear.

It is of the greatest practical importance to find out every circumstance in the causation of disease in any case which may come before us, for it is only by so doing that we can hope to cure the patient of his disease by rational and scientific treatment. Anything which tends to prevent the discovery of every causal factor of disease likewise tends to retard the progress of rational medicine. It is this characteristic of thorough investigation of the causation which distinguishes the true practitioner of medicine from the "quack," or medicine monger, who simply shoots in the dark.

HYPERÆMIA OR CONGESTION.

Physiologically by Hyperæmia is meant an excess of blood in any part which is said to be hyperæmic; anatomically Hyperæmia may be arterial or active, capillary or passive, venous or mechanical.

Causes.—The essential cause of active hyperæmia is paralysis of the muscular coat of the arterioles, due to loss of tone, which loss is believed to be dependent upon the active influence of the vaso-motor nervous system. Stimulation of some nerves by means of heat and electricity may cause dilatation of arteries. Hyperæmia may result from a lesion of the brain and cord or sympathetic nerves, and this lesion which need not be severe may be induced equally by stimulation of sensory nerves, when the hyperæmia is said to be of reflex origin.

Flushing or blushing is a good example of hyperæmia resulting from emotional disturbance, and probably originating, therefore, from the cerebral cortex in the first instance. This form of hyperæmia is most commonly observed as the first step towards inflammation, and it may be induced, perhaps reflexly, by mustard leaves, poultices, heat, and cold, applied to the skin. Active hyperæmia is seen in the cheeks in hectic fever, and in one cheek in pneumonia. It may be seen in regions affected with neuralgia, as in hemicrania, when the temporal artery may be seen and felt to be throbbing and swollen, and all its contiguous skin engorged and swollen. Hyperæmia may be the effect of dry-cupping, *i.e.*, removal of atmospheric pressure, and of the removal of fluid pressure, as when congestion of the peritoneum results from the rapid withdrawal of fluid from the peritoneum.

Many skin diseases are nothing more than active hyperæmia, as for example, rheumatic erythema, scarlatinal rash, roseola. The mechanism of these hyperæmias is doubtful, but drugs and poisons in the blood may act either directly on the vessels or on some part of the nerves.

Diagnosis.—Hyperæmia has to be diagnosed from purpura or hæmorrhage and from inflammation. From the former it is easily distinguished by its complete disappearance on pressure, and its rapid return after removal of the pressure. From the latter it is less easy to distinguish, for in both there is redness and heat of the part, and in both there may be pain and swelling, but in hyperæmia there need be no pain or tenderness, and the swelling is usually slight. Usually with inflammation there is fever, but not with hyperæmia.

The symptoms vary with the part affected; the

colour is bright red, and may occur in points and streaks or be more uniform; this dotted and striated appearance is very characteristic as seen in the skin and meninges.

MECHANICAL OR VENOUS CONGESTION.

In this form the excess of blood in the part is due to its not being able to get away, whereas in active hyperæmia too much blood comes to the part. A mechanical obstacle not completely obstructing all the venous channels is the chief cause, and a weak heart, which leaves but little force in the circulation after the blood has passed the resistance in the capillaries, is also a powerful cause. Gravitation, therefore, aids also in the production of mechanical hyperæmia. Long-continued mechanical hyperæmia leads to œdema, and finally, always and everywhere in the body, to an overgrowth or extra production of connective or fibroid tissues. Piles or hæmorrhoids are good examples of mechanical congestion, due to portal obstruction, and the varicose veins of the legs illustrate the influence of gravitation, whilst the blue hands, feet and nose of heart disease, are examples of diminished force of circulation.

Symptoms.—The part affected is dark-blue in colour and slightly swollen, and its temperature not raised; it soon becomes cold if exposed. The veins are distended and form a mesh-work. If there be swelling the part pits on pressure from œdema. If the obstruction be nearly complete then many red blood discs may pass out of the capillaries, actual hæmorrhages may occur, and clotting of blood in the veins result. But then we should have to confess that besides venous congestion, there was purpura and thrombosis. The

sensations in the affected part are generally disagreeable, and may be positively painful.

The diagnosis has to be made from active hyperæmia by the colour of the part, and by its relative coolness. From passive or capillary hyperæmia a diagnosis is not necessary, the only difference being that in the latter the capillaries only are overfilled; the causes of the capillary hyperæmia are chiefly and essentially a feeble circulation, however produced, whether as the result of nervous debility, of cardiac weakness due to fevers and other obvious causes, or insufficient food and clothing, etc.

The hypostatic congestion of exhausting illness affects chiefly the dependent parts and the lower lobes of both lungs, but especially of the left, in this case the feeble respirations are a powerful cause of the deficient circulation of the blood. After active hyperæmia and inflammation, and in tissues which are out of tone from alteration of the blood or from defective innervation (as in infantile palsy), there is capillary passive hyperæmia, the part being dusky in tint and cool to the touch.

ANÆMIA.

Of oligæmia or spanæmia signifying diminution in the quantity of blood in the whole of the vascular system, we shall treat elsewhere. Local anæmia, like local hyperæmia, affects areas of varying size, and may be due to thrombosis or embolism of an artery, the latter may be clearly seen in the central artery of the retina by means of the ophthalmoscope; or to pressure on the nutrient artery from without; or to swelling of the coats of the artery as in endarteritis; or to spasm of the muscular coat. The whitening of the face

in epilepsy, the patches of white skin seen in many nervous affections, the dead fingers—digiti mortui—of hysteria and other nervous affections, and ergotism are probably samples of arterial spasm causing anæmia. From physiology it is obvious that vascular changes, whether hyperæmic or anæmic may result from cardiac alterations, from derangement of blood pressure, and from disorder of the principal or subsidiary vasomotor centres, as well as from affections of the vessel wall.

In trying to discover the cause of anæmia or hyperæmia, the whole physiological apparatus should be held in mind. For example, poison, like rheumatism, in the blood, may induce erythemata. We must consider whether this is brought about by the taint acting through the vasomotor centres, central or local; whether it acts directly on the capillaries of the affected part; or it may have to be discussed whether it is of reflex origin, the intestines being a possible source of irritation. In most cases it seems impossible to point out the exact mechanism.

Any tissue which is deprived of blood or anæmic from any cause, always has its functions damaged or abolished. This loss of blood is the essential cause of hemiplegia when an embolus or thrombus obstructs the sylvian artery of the brain.

Ichæmia denotes an interference with the supply of blood to a part, and may be due to the same causes as local anæmia, acting in a less degree. The coronary arteries being diseased, the flow of blood through them becomes impeded, and this causes changes in the heart muscle. Since a due supply of blood to a part is necessary, not only for its proper working, but also for its continued life, it will be readily understood that structural changes as well as functional loss or impairment always go together (*see* Fatty Degeneration).

The diagnosis of local anæmia rests on the whiteness and coldness of the affected part; there may be much and severe pain, but generally tenderness is absent and sensation and motion lost or impaired.

DROPSY.

An accumulation of serous liquid in the loose tissues of the body, as in the subcutaneous tissues and lungs, and in the serous cavities. The vessels especially the veins leak unnaturally, or else do not suck up the fluid, hence the accumulation. This leakage or failure of absorption often results from disease of the vessels and tissues, as in inflammation, from disordered nerve influences, altered blood states, or altered blood pressure, *e.g.*, obstruction of veins or lymphatics, or cardiac disease. When the accumulation is general, anasarca is the word employed; hydrocephalus, hydrothorax, hydropericardium, hydrocele, ascites, are local dropsies respectively of the cerebral ventricles, pleura, pericardium, tunica vaginalis and peritoneum.

Dropsy is diagnosed by the symptom called pitting, the pressure of the tip of the finger displaces the fluid, and leaves a pit which refills with varying rapidity. Dropsy is merely like hæmorrhage an effect or manifestation of something else. Its treatment is removal of the fluid by tapping or acupuncture, provided that diuretics, diaphoretics and watery purgatives have failed. Slight dropsy from anæmia may be removed by improving the blood state by means of iron. In blood states and in heart disease, gravitation assists in the production of dropsy. The foot, especially the tissues about the malleoli, the eyelids, the scrotum, and the tissues over the sacrum, are seats of election.

Except in the cerebral ventricles and the spinal cord (hydrorrhachis), the fluid is highly albuminous and the specific gravity above 1010.

HÆMORRHAGE.

The escape of blood from vessels either on to the surface of the body—hæmatemesis, hæmoptysis, epistaxis, stomatorrhagia, hæmaturia, menorrhagia, melæna, when the stomach, lungs, nose, mouth, urine, uterus, and intestines respectively supply the blood—or into the tissues, when the various extravasations result, as cerebral and pulmonary apoplexy. Hæmorrhages may be due to disease of the blood as in the malignant fevers, to disease of the vessels and other tissues as from aneurysms, to increase in blood tension, and also from altered nervous influences (*see* Purpura). In chronic congestion and inflammation a diapedesis of red blood discs and also a passage outwards of transuded hæmoglobin occur.

THROMBOSIS.

Thrombosis is clotting of blood within blood channels, and owns the same general causes as any other morbid process, *i.e.*, altered blood states, lowered blood pressure, altered states of vessels, altered nervous influences, the first three being most potent. The clot is called a thrombus, and the state of blood most conducive to its formation, hyperinosis, which blood state is common in acute rheumatism, pneumonia, pyæmia and septicæmia. When a clot is slowly formed during life it is tougher and harder than when formed *post-mortem;* it is adherent to the wall of the vessel and undergoes

changes; often laminated, from the clot being slowly formed in layers; it may become organised by blood vessels growing into it from the vasa vasorum, chiefly in arteries, or it may degenerate becoming opaque and friable especially in the centre, chiefly in veins. Thrombosis is apt to occur, in veins especially, from such exhausting diseases as cholera infantum, phthisis, cancer, pyæmia and puerperal fever; the stagnation of blood from a weak action of the heart and the altered blood are then the chief causes of it.

Clotting may occur in the cavities of the heart in diphtheria, scarlet fever and puerperal fever, chiefly from the blood state, when they are called polypi or fibrinous concretions; on the valves of the heart from endocarditis; on the walls of arteries from atheroma and in aneurysms.

When a portion of the clot becomes detached, this cast off piece is called an embolus, and when it is carried by the blood stream to another part of the vascular system the process is called embolism.

EMBOLISM.

Emboli may block cerebral arteries, and a common source of the embolus in these cases is diseased valves of the heart, especially mitral stenosis. The arteries of the spleen and of the kidney and the portal veins of the liver are common seats of embolism. Where an embolus lodges further clotting sets in around it.

When embolism occurs in a terminal artery, *i.e.*, one which does not freely anastomose with its neighbours, a collateral circulation cannot be set up, and the part supplied by the blocked artery dies, including of course that part of the artery and its branches and capillaries beyond the ob-

struction; these vessels having lost their vitality, the blood getting into them from the veins by a backward flow escapes into the tissues, and a hæmorrhagic infarct or stuffing (*farcio*—I stuff) results.

If the embolus came from a septic or infective thrombus, the infarct and tissues around it become septic or infective and inflammation results; if the parent thrombus giving off the embolus came from the neighbourhood of a pyæmic abscess, the infarct also suppurates and constitutes a fresh pyæmic localisation; this is the mode of origin of metastatic abscesses. If the embolus was not infective, it, together with its consequent thrombus, may become absorbed, or if the collateral circulation be insufficient or the clot very large, simple softening may occur, and the softened stuff may become absorbed, a scar consisting of the organised parts alone remaining.

INFLAMMATION.

INFLAMMATION must be studied in works on pathology, but the following rudiments may be here stated.

Like any other morbid process inflammation may arise from toxæmia, from disease of the walls of the blood vessels, from alterations of blood pressure in certain sets of vessels, *e.g.*, after removal of a ligature from the renal artery Cohnheim observed inflammation in the kidney, and from abnormal nervous impulses, *e.g.*, herpes zoster. Doubtless in most inflammations more than one of these causes is at work.

In inflammation there is undue escape and insufficient absorption of fluid, hence the exudation; besides red and white corpuscles migrate or es-

cape into the tissues outside the vessels, probably they migrate from their own movements, perhaps the blood pressure assists their passage outwards. The blood stream at first is accelerated as in hyperæmia, hence the heat and redness of inflamed parts, then the stream of blood gets slower in the most damaged parts, and in the very centre of these most damaged parts actual stoppage or stasis of blood occurs. The migration of corpuscles does not occur in the parts where stasis exists, but only or chiefly where the circulation is slowed. Observe also that when the blood vessels are very greatly damaged extravasation, hæmorrhage, occurs; in order to get inflammation the nutrition of the tissue of the vessel wall must be impaired not devitalised. The tissues around the vessels exhibit signs of increased nutritive activity but this question is too complicated to discuss here. The tenderness and pain of inflamed parts are due to the altered nerves of the part, and the swelling to the exudation. The clinical signs of inflammation are fever, and the *tumor*, *dolor*, *calor*, *rubor* of the ancients.

HYPERTROPHY.

Hypertrophy, or increase in the size of the part, may be due to an increase in size of its constituent parts or to a multiplication of these elements—hyperplasia. Hypertrophy is due to an increased functional activity of the part; its best examples are the heart when any obstruction exists to the outflow of blood from its cavities, and the compensatory hypertrophy of a kidney when its fellow does not exist or has been destroyed. In order that hypertrophy can occur, it is necessary that a plentiful supply of nutritive material should be obtained; if not, atrophy will ensue.

Many so-called hypertrophies are false, *e.g.*, overgrowth of the brain which is due to an increase of the supporting tissue, *i.e.*, neuroglia; or hypertrophy of the pons Varolii which is really a gelatiniform gliomatosis.

ATROPHY.

Atrophy rarely occurs in pure and simple fashion; it is the polar opposite of hypertrophy. Infants often fail to grow and this process is called infantile atrophy or food atrophy, because deficient food causes it. The heart may become atrophied from not doing its usual amount of work, as in phthisis, cancer, and chronic exhausting diseases. Since atrophy is so frequently accompanied by degeneration the causes may be considered side by side with degenerations.

DEGENERATIONS.

In these affections the quality of the tissues is impaired, whereas in pure atrophy the quantity of the tissues simply undergoes diminution. Degeneration is due to perversion of the nutrition, generally the result of diminished supply of blood. Atrophy and degenerations may result, like other morbid processes, from derangement of blood, of blood supply and pressure, of vessel wall, or of nervous influence. The tissues in degeneration suffer a chemical conversion, from pure protoplasm they become granular, fatty, hyaline, or other sorts of chemical material. When the metamorphosis is into fat we call it fatty degeneration. Caseation is fatty degeneration with a want of fluid in the part.

These changes are due to interference with the blood supply, as from obliterative arteritis or from intense anæmia, the hæmoglobin being insufficient to keep the protoplasm as such; the chronic arteritis of the coronary arteries, causing patchy fatty metamorphosis of the heart, is a good example of the former cause. Crude or yellow tubercles are due to caseation or dry fatty change of tubercular formations. In old age the protoplasm often becomes converted into fat, partly from diminished vitality and partly from defective supply of blood; congestion and inflammation act in the same way.

Mucoid degeneration is similar, but the resulting substance is mucin, which contains no sulphur, and is precipitated by citric or acetic acid; the tissue becomes soft and gelatinous like thick mucilage. New growths of sarcomatous kind and myxomata are good examples; the intervertebral and costal cartilages of the old may show this change; its causes are ill understood.

Granular degeneration is the cloudy swelling of solid viscera seen in fevers, it often heralds the fatty degeneration; the minute granules are composed of proteids, dissolve in acetic acid, contain sulphur, and are not like fat, soluble in ether.

Colloid degeneration is something like mucoid, but the resulting material is stiffer and more like glue, moreover it contains sulphur and is not thrown down by acetic acid; a good example of it is the so-called colloid cancer; the actual cell elements are turned into chondrin, whereas in mucoid degeneration intercellular connective tissue is most commonly the source of the mucin; mucoid degeneration is like the connective tissue of the embryo; the umbilical cord is composed chiefly of it.

Lardaceous, amyloid or albuminoid degeneration is a waxlike metamorphosis of certain tissues which become hyaline, transparent and homo-

geneous from the presence of lardacein. This stuff is nitrogenous and allied chemically to fibrin, but it is not digested by pepsin and hydrochloric acid. It stains mahogany colour with free iodine and rose red with methyl violet. It first begins in the small arteries of the spleen, liver, kidneys, villi of the intestines and lymphatic glands.

The organs affected become large, stiff, and brittle, and weigh more than natural. Long continued suppuration from phthisis, struma, bone disease and syphilis are its clinical causes; it is often associated with other changes.

Some authorities teach that the last three degenerations are really infiltrations or deposits of abnormal material from the blood, the organs or tissues being merely receptacles for the secreted product.

INFILTRATIONS.

Fatty or oily material is often deposited in excess in the connective tissue cells of the body and in the liver cells. Excess of fatty, starchy, or sugar food combined with deficient oxygenation of the blood—as in anæmia or sedentary habits—is the main cause. The fatty liver of phthisis is chiefly due to imperfect aeration of blood. In some people fatty infiltration of all the tissues of the body is hereditary and may be due to the nervous system, lipomatosis, as it is called, is common in some idiots—lipomatosis neurotica.

Calcareous degeneration is generally intercellular in position and due to interference, with diminution, of the blood supply and dryness of the parts, like caseation, with which and fibroid changes it is often associated. Like cicatrisation it points to chronicity of pathological processes; so also does pigmentation as seen in the lungs.

The arteries and pathological products, *e.g.*, tubercle, often show calcareous change.

Melanin particles, insoluble in ordinary acids, probably ultimately derived from the hæmoglobin, may be deposited in many tissues and cause pigmentary infiltration as seen in melanotic sarcoma, cancer, Addison's disease, or the negro's skin.

Blood when extravasated undergoes changes and causes pigmentation of tissues from hæmatoidin granules and crystals; these colour the part rusty-red or yellow: as witness red atrophy of liver, brown induration of lungs, and the cicatrices of cerebral apoplexy.

The pigmentation of lungs is due partly to the smoke or carbon inhaled, and partly to dust from knives, etc.; as in miners', potters' and knife-grinders' phthisis.

Lead sulphide may pigment the edge of the gums and metallic silver stain the cutaneous tissues.

Section II.

PATHOLOGY OF FEVER.

The temperature of the body is clearly under the control of a regulating mechanism situated in the central nervous system. This governing office makes use of various nerves including the vaso-motor nervous system and other nerves regulating the "metabolism" of the body. There is a certain production of heat and a certain expenditure of the same. The proper balance between these two processes of income and expenditure it is the function of the nervous mechanism to maintain. Of the existence of such a nervous centre or centres

there is good evidence. One of the best experimental proofs of the power of the nervous system to regulate and altogether control the temperature of the body is that found out by Brown-Sequard, who detected a certain spot near the vaso-motor centre, stimulation of which caused the temperature of the body to fall and the blood in the veins to run as red as that in the arteries, whilst the discharge of CO_2 and urea was almost stopped—proving that this centre had the power of practically arresting metabolism, and yet the heart and respiration continued and there need be no necessary change in the blood pressure. Of course the thermic centres assumed to exist, do not in themselves constitute the material source of heat. The heat is derived from oxidation of material in the muscles, heart, liver, and nervous centres, and other subsidiary sources of heat exist in friction and the various actions that go on in the body, for physiology and physics prove that every form of force must ultimately become heat if it be dissipated. The physical properties of radiation, conduction, and evaporation, as of sweat and moisture in the respiratory passages, are the means for getting rid of the heat formed as above indicated.

The controlling nervous mechanism simply maintains a due balance between production and expenditure, and the agency, by which it accomplishes this end, is partly known. For instance, exercise causes a greater oxidation of material and therefore greater production of heat; yet the body temperature remains normal. Here the nervous centre probably acts by increasing the radiation and conduction of heat from the various surfaces of the body, for the skin becomes fuller of blood and relatively warmer than usual; the increased respiration tends to throw off some of the extra amount of heat. This is in outline the way in

which the normal temperature is explained; for fuller detail works on physiology may be consulted. Now in fever the nervous mechanism is thrown out of gear, and the barter between the income and the output of heat is disturbed.

Conceivably, fever may arise as the result of increased production or diminished expenditure, but whichever process preponderates (or they may both be in action), it seems clear that the nervous machinery is primarily at fault. Now the causes of fever in this view are the causes which throw the nervous mechanism out of order.

These causes may conceivably be changes in the state of the blood and circulation supplying the nervous centres concerned, and actual damage to the nervous centres by direct or reflex injury or influence on them. In many acute specific fevers it must be the actual poison or virus, or some necessary companion of this material, which is the cause in the blood of the disordered state of the thermogenetic or heat regulating mechanism. In hæmorrhages the fibrin ferment liberated is absorbed into the blood and acts on the thermic nervous centres, disturbing the normal balance. Any agent, absorption of which into the blood causes fever, is termed a pyrogenic agent. But besides blood poisons or abnormal states of the blood, injuries, diseases and disorders of the central nervous system may cause fever. In inflammation of any part, it is conceivable that fever may arise, either by toxæmia—a pyrogenic material being absorbed from the inflammatory focus and acting on the regulating nervous mechanism—or by reflex nervous action through sensory nerves, which are in connection with the heat centres. In tetanus, in other nervous diseases, and in hæmorrhages into the brain or inflammation of the cord, it may be that the heat centres are primarily disordered by the direct influence of the disease on

the nervous centres, but it is conceivable that even here a poison or pyrogen may be operative.

The precise situation of the heat centres is doubtful, and some authorities even doubt the actual existence of them, though it is preposterous to doubt their potential presence. Some think they are identical with vasomotor centres, others with centres for controlling the metabolism of the body, but our view is that such heat centres do exist and that they make use of the other centres and nerves in order to effect their purpose. It is most probable, that the chief thermic centre is in the floor of the fourth ventricle, and it is highly probable, that subsidiary centres are distributed throughout the spinal cord and brain. Much evidence has of late been adduced to show that thermic centres exist about the fissure of Rolando in the "motor" area of the cerebral cortex, and from these centres thermic paths descend the corona radiata and other fibres conducting downwards.

FEVER OR PYREXIA.

A RISE in the temperature of the body is the sign by which we diagnose the existence of fever. There are three main degrees of pyrexia. By *slight* pyrexia or fever is meant, any temperature below 101°; by *moderate* pyrexia, any temperature above 101° and below 103°; by *high* fever, any beyond 103° up to 106°. Above this degree the term hyperpyrexia is used.

The normal temperature of the body is 98·4° F., but the corporeal temperature is liable to a natural diurnal variation, and certain other fluctuations may be induced by alterations in the mode of life, by food, exercise, and climate.

Whenever the temperature of the body transcends the normal limit, certain other phenomena are generally observed, and these appear to be simply due to the pyrexia. Consequently, given the existence of fever, the doctor immediately knows that certain other phenomena may be present. Now although this simply follows as a matter of common sense, still it is worth repeating for at least one good reason. Many students are often puzzled by the long array of symptoms which find a place under the description of any febrile disease. The student thinks he must "get up" this long list of symptoms for each separate febrile disease. Now this is not only unnecessary, but it is positively embarrassing to the student, whose memory need be no further charged than to know, that with a slight degree of fever he will find certain phenomena, just as he will find more marked symptoms with a moderate and high degree of fever.

Mere pyrexia causes, or is associated with, changes in the various systems of the body, and these may be related as follows:—

Derangements of Nervous System are chiefly disorders of sensation and motion, sometimes also the mental functions are perturbed. The chief sensory nervous symptoms are feelings of chilliness, sometimes associated with the motor symptoms of shivering, which may be limited to chattering of the teeth, from clonic spasm of the muscles supplied by the motor part of the fifth nerve nucleus, or may extend to the whole body, when the bed or chair on which the patient rests may be violently shaken; or the cold sensations may alternate with sensations of flushing and heat—which are then referred to the vaso-motor system and get the name of vaso-motor phenomena.

Other sensory nervous phenomena are flying pains about the trunk and limbs, sometimes asso-

ciated with aching and boring, more continuous, pains.

A common mental symptom is disappearance of the feeling of health or *bien être* (euthanasia), and the appearance in its place of a feeling of ill-health, malaise or dysthanasia.

Headache and giddiness are very common disorders of sensation due to fever; as also is restlessness a common motor disorder; nocturnal delirium and insomnia being common mental disorders.

Indeed, with moderate or high fever, there nearly always exists all, or at some time or other there is present any, of the above phenomena.

A long continuance of fever gives rise nearly always to an increase in the intensity of the knee-jerk, to the development of ankle clonus by sudden passive dorsal flexion of the foot, to muscular twitches (subsultus tendinum), to muttering or violent delirium, prostration of mental and muscular powers, especially the heart muscle, and sometimes to convulsions and coma (*see* Typhoid state).

Fever alters the respiratory functions, and this may be regarded, likewise, partly as a nervous phenomenon; the number of respirations is not diminished but always increased, there generally is a certain proportion between the increased frequency of respiration and the pulse rate which is also quickened. Normally the pulse respiration ratio is four to one, and this natural law makes its influence felt, even during fever, but this influence is not always paramount, as for example in pneumonia the ratio may be altered so as to become two to one, the breathing being 60 and the pulse 120.

The circulatory system is also thrown out of gear by fever; the heart beats more rapidly and there is some proportion between the temperature

and the increased frequency: for every Fahrenheit degree of fever the pulse rises eight to ten beats, so that a temperature of 101° usually gives a corresponding pulse of 90 per minute—supposing the pulse of the individual to beat 66 per minute, when the temperature is 98·4°. Fever also alters the blood pressure, which is raised during a rigor and lowered when the skin is full of blood and the internal viscera and vessels comparatively emptied. So the pulse becomes more dicrotic and more compressible after fever has been present, and as the heart muscle grows weaker the pulse also gets feeble.

Very interesting changes occur in the *metabolism* of the body: there is retention of water in the system and scanty urine with, generally, diminished perspiration. The quantity of carbonic acid discharged per diem is increased, if we take into account the diminished supply of food and diminished intake of oxygen.

Accompanying the diminished elimination of water the skin and mucous membranes are apt to be dry, the salivary, biliary, gastric and enteric secretions deficient; and probably these facts explain the thirst, the dryness and furriness of the tongue, the tendency to nausea and vomiting and constipation; whilst it is easy to understand that such changes should spoil the appetite, cause the breath to be offensive, create abnormal sensations of taste in the mouth, and make an unpleasant odour arise from the cutaneous surface.

The urine, besides being small in quantity, contains an excess of urea and uric acid from excessive metabolism of the tissues of the body; it is of powerful odour, dark coloured, very acid and of a high specific gravity. On cooling it deposits urates and uric acid, which generally have a brownish or pinkish colour. The sodic chloride of the urine is generally markedly diminished

in quantity, and the salts of soda are diminished, whilst those of potassium are increased. It will be remembered that the chlorides and sodium are the chief mineral constituents of the fluids of the body, whilst the phosphates and potassium are the chief mineral constituents of the tissues. In health the urine, like the blood, contains more sodium and chlorides, whilst in disease the urine undergoes changes in chemistry which approximate it to the solid tissues, thus it contains, like them, more potassium and phosphates, and, like them, also more colouring matter. The red blood and white blood corpuscles of course count as solid tissues. Now this comparison leads to the suggestion that in health the metabolism of the solid tissues is either very small as compared with what occurs in fever, or else that metabolism chiefly occurs in the blood fluid—against which view there are strong arguments. Whichever view is true, it is clear that the urine approximates in composition to the solid tissues, and deviates from the composition of the fluids of the body, and therefore it is most likely that the altered composition of the urine is due to an alteration and exaggeration of the metabolism of the solid tissues and chiefly of the muscles, liver and red blood discs. All these parts are highly coloured with hæmoglobin, and it is certain that the high colour of the urine is not to be solely accounted for by the scantiness of the water, and it is highly probable that hæmoglobin is the ultimate source of the urinary and of all the colouring matter and pigments of the body.

In fever the number of white corpuscles in the blood is slightly increased, and there may be slight albuminuria.

As a consequence of the excessive metabolism the body wastes and the blood becomes poor, so we observe emaciation and anæmia.

The student is earnestly requested to thoroughly master the foregoing facts, for the author proposes to save space, and also help the student, by not repeating the general consequences and symptoms of fever when he comes to treat of the symptoms and consequences of acute specific fevers and other febrile diseases. When the latter subjects are under discussion he will merely point out the way in which the symptoms of this or that fever differ from the symptoms of general fever.

COURSE AND TERMINATIONS OF FEVER.

Fevers, like all other morbid processes, have a beginning, a climax and an ending; but fevers may begin suddenly—the stage of invasion (cold stage), or may commence more slowly, and so they may terminate suddenly (by crisis), or slowly (by lysis). Ague is in its typical forms a splendid example of a marked attack of fever; there is a sudden onset or cold stage, stage of invasion, followed by a climax or acme, the hot stage, and finished up by a sweating stage or crisis, or stage of defervescence.

The mode of onset of fever therefore varies, and so does the course of the fever as well as its termination. When the fever remains high or moderate for many days together and without suffering any great daily variations, we call it continued. When there are marked fluctuations either daily or every two or more days, we call the fever remittent. Intermittent is the name given to fevers when the pyrexias are separated from one another by periods of actual apyrexia or no fever. Relapsing fevers are so named when *continued* fever recurs after seemingly having altogether disappeared for a time, usually measured by a few days. Hectic fever is either intermittent

or remittent, the intermissions or remissions occurring usually every day and once a day only. It is the fever that most attends prolonged suppuration, as in phthisis and Pott's disease. The sweatings are profuse as a rule and occur during the defervescence of the febrile exacerbation. The *hectic flush* consists of two bright red cheeks, and is most marked during the hot and dry stage of the hectic exacerbation.

The *typhoid state* is a term applied to denote the presence of a certain group of symptoms which are usually the outcome of either blood-poisoning or prolonged fever, or of both these causes. The chief symptoms are a dry brown tongue with sordes on the lips and gums, and muttering delirium. There may be subsultus tendinum or twitching of the muscles which makes tendons become prominent; the reflex actions are usually exaggerated and the knee jerks increased, and there may be ankle clonus. The stupor of muttering delirium may deepen to coma. The pulse is nearly always feeble and the circulation languid, with a tendency to stagnation in distant and low-lying parts. The decubitus of the patient is indicative of prostration, and is usually dorsal and recumbent, with the head dropped forwards so that the chin rests on the sternum. The patient may pick at the bed clothes, pass urine and fæces under him, is often very hard of hearing, and frequently has diarrhœa.

The typhoid state is the expression of profound prostration of the nervous system, and the cerebral cortex, with all its functions of perception, of motion, and of sensation, is lowered and blunted, sometimes nearly to abolition, whilst the heart, nerves and muscles often seem to suffer in equal degree. All the acute specific fevers, but especially typhoid fever and pneumonia; uræmia and acute yellow atrophy of the liver, may make a marked picture of the typhoid state.

CONTAGION.

THE word contagion or contagium is given to that substance which is capable of transmitting a disease from one individual to another. The same word is also employed in another sense to signify the doctrine of transmission of disease. It is conceivable that this doctrine may be true or false. Suppose two individuals get scarlet fever, the one on Monday, the other on Saturday, there are three ways at least by which to account for these two persons having the disease. The one may have caught it from the other, or they may both have taken the disease from a third case which occurred earlier than either of them; this is an illustration of the principle of contagion. It is conceivable that the disease may have developed in each individual under the influence of certain conditions, and these conditions may have been certain changes in the environment (extrinsic), or they may have been certain alterations in the tissues and fluids of the person affected (intrinsic or autogenetic or autochthonous). Neither of the last two views is now accepted, and we believe that all acute specifics originate in the individual as the result of transmission from previous cases.

The agent of transmission, which may be called the virus or poison, we believe, is generally a LIVING thing and perhaps a bacillus, bacterium or micrococcus. This is the chief idea of the "germ theory of disease." But it is conceivable that dying organic (PHYSICO-CHEMICAL) matter or a mineral CHEMICAL substance may be the contagious instrument.

The vehicle of transmission probably varies in different diseases and in different cases: sometimes it is the drinking water, sometimes the germ

or contagion is air-borne, and on other occasions it may be that any of the ingesta (milk and other food) are the agencies by which the disease is conveyed from one individual to another.

The germ theory of disease is chiefly founded on the assumed analogy between the morbid process of an acute specific fever and the chemical process of fermentation or putrefaction. As fermentation is a process, which in many instances is known to be due to the action of a living zyme or ferment, so it is conceived, and there are many grounds for establishing the truth of the conception, that the acute specific febrile process (*e.g.* scarlatina) is due to a living ferment. Fermentation often goes by the name of zymosis, and on the strength of the alleged analogy between fermentation and acute specific fevers, these latter are sometimes termed zymotic diseases—a designation which implies a belief in the view, that the chief cause of the acute specific fever is a living organism. Fermentation resembles an acute specific febrile process in several points: in both processes there is a period of latency or quiescent period during which nothing perceptible is taking place, either in the fluid which is about to undergo fermentation or in the individual who will shortly break out with scarlatina. This latent period is called the *period of incubation* of the fever.

In both processes the perceptible changes begin rapidly after the period of quiescence, and rapidly each process progresses up to maximum, when there is a more or less rapid subsidence of the changes. Then again each process is caused by a thing being introduced, in the one case into the fluid to ferment, and in the other case of the febrile process there is often very clear evidence of exposure to the contagion—this last argument is a little open to the objection that it rather begs the question. A further analogy between the two

processes consists in the circumstance, that neither the fermented fluid, nor the individual who has had the acute specific fever, is liable to undergo further fermentation in the former case, nor a second attack of the acute specific febrile process in the latter. This argument again is not a perfect one, for it is known that the same individual may, rarely, again have the same acute specific fever, and some specific diseases attributed to germs do not confer any considerable degree of immunity from a fresh attack of the specific disease.

The analogies are certainly striking, when we reflect that in each process there is probably a definite agent, a definite period of latency, a definite mode of onset, a prescribed course, and an equally determined finish. Theoretically, however, we must admit that the analogy does not prove an identity of nature of the two processes.

One grand argument has been left to the end, for it is very convincing and almost conclusively clinching. In fermentation the cause of the process is multiplied many thousand of times, and so it most probably is with acute specific febrile processes, the cause of the disease is increased in number in a most astonishing manner, and this will be evident in reflecting, that probably every desquamated particle in scarlet fever contains hundreds of germs and sufficient in quantity, therefore, to poison or infect a whole community. There are almost no known processes, physical, physiological, or chemical, except fermentations and acute specific fevers, in which the *causa causans* of the process is multiplied and increased in the fashion indicated.

What are the reasons which cause the process of fermentation, and if we accept the analogy, the morbid process of acute specific fevers, to come to an end or indeed to have a beginning. Most of us believe that just as it is the sugar in

yeast fermentation which is the food for the fungus, so it is a certain something in the tissues and fluids of the body on which the contagium feeds, and by means of which it multiplies, until this something is exhausted and will no longer afford the pabulum for the further multiplication of the germs.

The poison, virus or germ of one acute specific fever is special to that disease, so that it only causes that particular fever and no other. Hence we say that scarlatina produces scarlatina and not any other fever; so with measles and other acute specific fevers. This idea is sometimes expressed by saying that the disease breeds true.

COLLAPSE AND REACTION.

Life is a mixture of reaction and collapse. Reaction is the quintessence of oppositeness to collapse. Health may conceivably be the varying balance of action of these opposites. In disease the body is sometimes successively under the domination of collapse and reaction, as, for example, in cholera. Collapse and reaction are the expression of antagonistic nervous states; in the former there is no energy, in the latter there is a luxurious waste of energy in every direction; collapse is an example of inhibition or sheer exhaustion, in reaction the bits are removed from the mouths of the nervous molecular processes and the functions consequently run riot.

Symptoms of collapse.—The bulk of the blood is in the portal system and nervous system; the skin is empty of blood, pale, cold, clammy, this is very evident in the pinched drawn face; the temperature is generally below the normal; the pulse is feeble, small, varies in rate; respiration shallow, slow, frequently sighing; the vagus is de-

ranged as seen in the pulse, respiration, and in the occurrence of hiccup, nausea and vomiting; the vasomotor centres are paralysed, as seen in the empty arteries and skin. The motor centres shew their exhaustion in the extreme debility; the visual and auditory centres are deranged, witness the dimness of sight and the noises in the ears. The cerebral cortex or chief seat of mind may be undamaged or may be disturbed as evidenced by partial or complete loss of conseiousness.

Syncope is a mild collapse, often attended with loss of consciousness, due to actual failure of the heart, to which the collapse signs must be attributed. To distinguish between syncope and epilepsy is often difficult (*see* Epilepsy).

The symptoms of reaction are hot red skin, full bounding frequent pulse, and round portly face; the breathing is deep and frequent, the very opposite of collapse; the blood tension is high and the veins are well emptied, containing as little blood as possible.

The causes of collapse are toxæmia of any kind, some pyrexias, severe pain, violent mental emotion, perforation of viscera, hæmorrhage and injuries to important organs.

SIMPLE CONTINUED FEVER, FEBRICULA, SYNOCHA.

These synonyms are applied to cases of fever lasting a few days when we cannot assign to the cases any special name. Such cases may be atypical ones of acute specific fevers, especially of typhoid fever. In them no local inflammation or morbid change can be detected. And most of them seem to be due not to specific causes but to such general agencies as exposure to cold or to

heat from the sun, fatigue from over-work, or over-eating and drinking, especially in children.

The symptoms are essentially those due apparently to mere elevation of the temperature of the body, *e.g.*, lassitude, headache, anorexia, thirst, furred tongue, with increased pulse-rate and respirations, dry hot skin, febrile urine. There may be curious rashes and catarrhs, but nothing more definite. The duration is generally less than a week, and the fever usually suddenly subsides (crisis) and ends in rapid recovery of powers.

Treatment consists in confining the patient to bed, giving a fluid diet of milk, barley-water and beef-tea with boiled and filtered water or imperial drink to slack the thirst. The skin may be sponged down with tepid water if the fever be higher than 102°, and the bowels should be opened at the outset by a dose of gray powder, castor oil, or a compound jalap powder, according to the state of the tongue and previous motions. A yellow fur on the tongue is best treated by the gray powder; dry pale stools by the jalap, and if there be simple constipation castor oil in milk or the tasteless variety is quite efficient.

TYPHUS FEVER.

An epidemic, contagious and infectious fever, the accompaniment of over-crowding, bad ventilation and destitution.

The period of incubation is short, less than a week, like diphtheria and scarlet fever. The onset is sudden with chilliness or a rigor. The rash appears on the fifth to the seventh day after the onset on the sides of the lower part of the chest, and it soon becomes a purpura not disappearing by pressure; the number of hæmorrhages into the skin varies; the arms and legs may be

affected. Besides the purpura there is a morbilliform eruption, a subcuticular mottling of mulberry tint, this is more general in its distribution. The rash is sometimes absent in mild cases in children. It lasts till death or recovery ensues. Frontal headache is the most severe symptom, prostration with dull and heavy look is as marked as in acute pneumonia; the typhoid state rapidly supervenes; hiccup is common in severe cases. Delirium replaces headache after a few days and varies in intensity. The heart shews the great debility in the feeble impulse and shorter almost flapping first sound; syncope is a frequent danger; the depressed state of the circulation is preceded by a stage of excitement.

Remarkable deafness, either unilateral or bilateral, very contracted pupils with congested conjunctivæ and muscular tremors, are worthy of note.

The respiratory organs may become inflamed, pneumonia of the lower lobes being not infrequent. The termination is as a rule by crisis, and the duration of the fever ten or fourteen days.

Death may result from simple asthenia of the circulation or from the exhaustion of the typhoid state.

Typhus differs from typhoid in the sudden onset, shorter course, purpuric rash, and constipation; from meningitis in the delirium not co-existing with headache, the rash and the general absence of vomiting and retraction of the head.

The morbid anatomy presents nothing different from that of death from any severe form of fever (*see* Septicæmia). The alimentary canal is not ulcerated. The treatment consists in supplying an abundance of fresh air, of which there cannot be too much. Shaving the head and using the ice-bag or capilline head tubing are valuable. Feeding and stimulation are carried out as in other fevers;

the indications are the same as in any fever (*see* Pneumonia). Great care is required to prevent bed sores.

The prognosis is grave if the patient has a sense that he will not recover. Lying on the side is a good sign if this posture be adopted by the patient himself.

TYPHOID FEVER.

Enteric, gastric, infantile remittent and pythogenic fevers. The contagion is conveyed by drinking water, milk, and perhaps by the atmosphere or from the soiled linen of patients by direct contact; hence the importance of general and personal hygiene. Sewage, sewer gas and bad drains are other harbourers of typhoid.

The period of latency between the inception of the poison and the onset of the disease is long, usually a fortnight or three weeks. The invasion is insidious, marked by headache, malaise, listlessness. The chief symptoms are present at the end of the first week of the illness. Then there is fever as much as 105°, cough with bronchitis, diarrhœa with pea-soupy stools, large spleen, gurgling in the right iliac fossa, tympanites, rose colored spots chiefly on the abdomen. The rash appears on the seventh or eighth day, consists of minute round or oval papules, which can be felt to be slightly elevated, pressure causes the colour to disappear for a moment; unlike typhus rash they come out, like chicken pox, in crops, which last a few days. It first appears on the belly, but may be found on any part of the trunk and limbs.

All the symptoms vary in intensity, usually directly with the severity of the disease.

The temperature rises slowly in staircase fashion, there being an evening rise of two degrees, with a

morning fall of one, until the end of the first week; for the next two weeks the fever is continued usually with a daily variation of one and a half to two degrees, and the fourth week witnesses a gradual declension or lysis. The pulse may be slower than is usual with febrile temperatures. The bronchitis may be complicated by hypostatic pneumonia, as the fever induces greater weakness.

Hæmorrhage from the bowel may occur during the first week, but is then usually slight and due to mere congestion and irritation by food; its dangerous period is during the third week, when the sloughs are separating from the ulcers. Perforation is another great danger during the fourth week, especially after the sloughing has left the ulcers with thin bases and before healing has ensued; it may occur later, should the ulcers fail to heal soundly, which may be due to some weakness of the intestine but more generally to improper feeding or treatment. A fall of temperature usually attends severe hæmorrhage and perforation.

Death may occur from asthenia, neurasthenia, perforative peritonitis, or pyæmia.

Constipation may be present at times or nearly all through the fever, and this is so in some severe cases of deep ulceration and marked tremors, with other signs of a severe typhoid state.

The *morbid anatomy* is chiefly characterised by the state of the Peyer's patches and lymphoid follicles of the intestines. Most marked in the lowest part of the ileum, there is first swelling and congestion, corresponding to the first week of the fever, then erosion and ulceration follow with more marked sloughing, by which large ulcers are formed with thin, smooth bases, undermined, overhanging, thin edges. In healing, this edge becomes agglutinated, and the ulcer heals from its circumference with no tendency to puckering

or constriction. The mesenteric and mesocolic glands, in relation with the diseased areas, also become enlarged and subside gradually as recovery ensues, but should they remain swollen or undergo caseation, nutrition is interfered with by such "tabes mesenterica."

Diagnosis is sometimes difficult. The best criterion in a doubtful case, is the pea-soup stools which are alkaline and contain triple phosphates. Well defined rose-coloured spots are practically pathognomonic, but doubtful spots may be seen in tuberculosis, from which disease a large spleen may also result. Tubercular meningitis is a stumbling block in children, since there may be tubercular disease of the intestines destroying the retracted abdomen and constipation of the meningitis. Strange as it may at first sight seem, pyæmia, ulcerative endocarditis, multiple periostitis, tubercular abdominal disease, may each have to be discussed in connection with the diagnosis of typhoid fever. As illustrating a difficulty in diagnosis, a case may be mentioned of a girl, aged 14, first seen fourteen days after the illness began; she died at the end of seven weeks, the temperature throughout being high, 104°—106°, the onset was with shivering; headache, later on delirium, vomiting, constipation, and screaming with a retracted belly and large spleen, were the chief symptoms; she passed a few pea-soupy stools, for a few days, at the third week of her illness, and at the fourth week the temperature subsided to 102°, but then rose again; we hesitated to cast away the diagnosis of typhoid fever, because of this remission and of the pea-soup stools, the necropsy showed ileal and cœcal ulcers, with pneumonia of the left upper lobe and upper half of lower lobe; there were no tubercles anywhere and no evidence of brain or cord disease. In typhoid fever the knee-jerks are never lost, exaggeration and ankle clonus are common; in

meningitis the knee-jerks are frequently lost, but may be exaggerated and with ankle clonus. Optic neuritis very rarely occurs after typhoid fever, never in the course of the disease. Relapses of typhoid fever are common, but are less fatal than first attacks.

Sequelæ are very common especially constipation, "after fever" and slow recovery of speech or brain functions. Phlegmasia dolens, nodes on the long bones, abscesses, parotitis, phthisis, anæmia, and wasting are not infrequent.

Treatment.—The stools must be disinfected with carbolic acid or corrosive sublimate, before being thrown away, and the soiled linen should be similarly treated and thoroughly washed at home or in hospital. It seems that the stool, as passed per rectum, does not give the disease to mice, but if kept a few days it is said to cause in them a similar affection to that seen in man; the conclusion is drawn that the poison must undergo a preliminary change, like the ova of tapeworm must go through an intermediate stage of development, before it is capable of causing infection.

Purgatives and solid food must be prohibited. If there is constipation in the first week of illness, some prescribe castor oil in small doses. As a general commandment solid food may not be given till three weeks, at least, have elapsed from the commencement of the illness, and not till one week after the temperature has been normal and the tongue and abdomen natural. The three weeks just mentioned applies to abortive atacks.

The nursing is the most important part of the treatment, because judicious feeding is more than half the battle, and the other half consists in avoiding accidents due to the unreasoning acts of the patient; sudden movements, getting out of bed, or straining have to be prevented, the bed pan

must therefore be systematically used, or what is better, where expense is no object, a sheet of compressed sphagnum moss, which soaks up all the fluid passed by the patient, may be placed in a suitable position and removed and burnt when necessary.

Plain milk should not be given, but it should be guarded with barley water and should be boiled. Condensed milk properly diluted, vegetable soup carefully strained, mutton broth or veal tea skimmed, whey and weak beeftea or Brand's essence, raw meat juice, are suitable articles of diet, and these may be thickened with Mellin's food, gelatine or other malted foods in strict moderation. In convalescence, the giving of solid food should be very cautiously proceeded with, the temperature, tongue and bowels being narrowly watched, after each fresh addition. A small quantity of bread and milk sop, then a little minced white fish, next a little minced meat, and later on mashed potato may be tried; vegetables should not be resumed till other things have been tried, because of their leaving a large quantity of residue.

Constipation may be relieved by a few ounces of soap and water as an enema; this may be followed by a rise of temperature for twenty-four hours.

Diarrhœa may be checked with chalk and catechu, and a little opium if there are more than three watery stools a day; a starch and opium enema does not upset the stomach.

Hæmorrhage should be treated by perfect rest and avoidance of effort, the stools being passed into napkins; opium should be given by the mouth. Gallic acid, turpentine, acetate of lead, and ergotin, are other remedies. Turpentine relieves flatulence and tympanites. An ice-bag over the right iliac fossa and iced water rectal injections are also employed. Sleeplessness and rest-

lessness may be relieved by cold application to the head, by bromides, hyoscyamus, or opium. Other symptoms should be treated as in fevers generally, and antipyrexia is likewise practised as in them.

RÖTHELN—GERMAN MEASLES.

An epidemic roseola distinct from scarlet fever and measles, not affording protection from either, common at puberty, of two weeks' incubation, with a rash, first appearing in the "oral circle" around the mouth and nose, of bluish measly tint but not so papular, nor crescentic in arrangement as measles, and coming out usually within forty-eight hours of the beginning of the fever which is not usually high. The swelling of the post cervical lymphatic glands and one over the mastoid process, is considered to be rather characteristic: the conjunctiva is congested; the throat sore, but coryza is absent, again differing from measles. Desquamation slight, albuminuria rare, duration one week at most, complete the essential features of this mild acute specific fever. In this and scarlet fever a "secondary" sore throat is apt to arise—a sort of relapse.

SCARLET FEVER.

The central features of scarlatina are a short incubation period, the appearance of the scarlet rash on the fauces and neck within forty-eight hours of the sudden onset of the high fever, which may be by convulsions in children, a more rapid pulse than the temperature requires, vomiting, strawberry tongue, red œdematous fauces, marked peeling of the skin, which may last six weeks and commences ten days after the appearance of the rash, tendency to acute nephritis during the des-

quamative period. The peeling often first commences about the roots of the nails.

Malignant scarlet fever refers to cases in which the nervous system suffers excessively, as is shown in the alarming convulsions, collapse and coma, with thready irregular frequent pulse, dusky surface, imperfect rash and frequent fatal termination.

Anginose scarlatina applies to cases with very bad throat; membranous exudation, ulceration or sloughing may occur, with great enlargement of the glands, œdema of the subcutaneous tissues and this may go on to brawny induration, suppuration, and even sloughing. Otitis, inflammation of joints which may be suppurative, pleuritic effusions and pericarditis, are not infrequent complications. The prognosis of simple scarlatina is not unfavourable, the other varieties are grave, but even when the throat and neck suffer severely recovery may ensue.

The following facts will help the differential diagnosis:—In simple sore throat, the slightness of the symptoms of invasion and the absence of the erythematous rash; in simple erythema, the absence of sore throat, the place of appearance and distribution of the rash and the slighter constitutional disturbance; in rötheln, the mulberry tint of the eruption, the presence of swollen post cervical glands, the slightness of the fever; in diphtheria, the mode of onset, the less marked redness and œdema of both fauces; in ague, attended with scarlatiniform rash, by the absence of sore throat, the previous history and other associations; if small pox presents a red rash this is generally about the lower part of the abdomen and the throat is differently affected.

Treatment.—Bed for ten days till the rash has faded, one room till peeling has finished, and strict isolation for six weeks from the onset. Nourishing

liquid diet, if possible, without alcohol. Frozen milk and beef-tea, ice pills, red currant jelly, raspberry vinegar and water, are grateful when the throat is distressing and much mucus accumulates. Cold wet compresses and poultices, gargles of any antiseptic solution or chlorate of potash, syringes and washing of the nasal passages with the same solutions, keeping the nose and throat as sweet and clean as possible without wasting the patient's strength, if this is a danger iodoform may be insufflated. Mustard baths for the malignant cases, stimulants for the severe throat cases. Abscesses should be opened early. Antipyretics may be employed. Desquamation is promoted by a daily hot bath (100° F.) and washing with coal tar soap. Some practitioners practice with success inunction of the whole body to relieve cutaneous irritation, reduce fever, promote sleep, aid desquamation and avoid contagion; to relieve the tension and irritation of the palms and soles by inunction, say of vaseline scented with eucalyptol, is certainly valuable. Ferruginous tonics round off the convalescence.

RELAPSING FEVER.

The period of incubation is short, under a week as a rule. The invasion is sudden with a severe rigor and prostration. There is no eruption.

The contagium is perhaps the spirillum of Obermeier—a corkscrew shaped organism, short lived at any temperature of the blood, in which Heydenreich believes successive generations must develop.

Like typhus it is a disease of poverty, famine and filth.

The symptoms are those of *high* fever with bilious vomiting, epigastric pain and tenderness,

and swelling of the spleen and liver. Jaundice is common. Crisis ends the first attack at the end of a week; the relapse usually occurs on the fifth day after the crisis and lasts about five days. Many relapses may occur, each one less typical than its predecessor.

The chief complications are bronchitis and pneumonia, rheumatic pains, diarrhœa, dropsy and ophthalmia. Pregnant women abort. The prognosis is favourable as a rule.

The treatment consists in relieving thirst, and in soothing by sponging the skin with tepid water. Cold drinks of barley water, milk and beef-tea, rest in bed, and a mild purge, are the chief requirements. Ten grains of Dover's powder given occasionally relieves headache, sleeplessness and restlessness. Iron and quinine quicken the slow convalescence.

VARIOLA.

Small-pox is due to a specific poison which multiplies in the characteristic pustular eruption seated on the skin and mucous membrane of the mouth, pharynx and larynx. Air and light assist in the development and maturation of the pocks which therefore appear first on exposed parts, as the face around the nose—the nasal circle; in the treatment of the pocks, to prevent marking, the room should be darkened and the air should be excluded by painting the pocks over with flexible collodion, or by touching them with nitrate of silver which forms an impermeable coating of coagulated albumen. In severe cases the pocks run together—confluent variola—if not the case is called "discrete." In modified variola—varioloid—pustulation scarcely occurs in the few papules which may simply pass away or become vesicular, with a

clear or slightly turbid fluid. The hard shotty papule is very characteristic, and these may be felt in the skin of the inner part of the cheek on the third day of the severe illness, which begins suddenly with a chill or rigor and high fever. At the end of seventy-two hours the fever falls generally to normal, and the crop of papules appears. During these three days an erythematous rash may be seen on the belly below the umbilicus. The poison is taken into the system through the air-passages and blood, and there remains latent for twelve days—incubation period. Severe lumbago or pains in the loins, severe headache, vomiting, and sweating of curious odour, are often marked symptoms during the three days preceding the rash. Other symptoms of high fever—105°—are present.

The papules become vesicular on about the sixth day and umbilicated. Then an inflammatory blush appears as an aureole around the vesicle which becomes pustular by the ninth day, and this suppuration is attended with fever which is proportional to the number of pustules and the amount of suppuration, being of a hectic type—secondary fever. The odour from the patient is peculiarly offensive. The pocks may appear on the cornea and conjunctiva; and ophthalmia may cause blindness. The laryngeal and pharyngeal pocks give rise to hoarseness and sore throat.

In severe cases the typhoid state may arise. Desiccation and disappearance of the pustules and scabs leave scars which at first give a curious mottling from staining, but after a time white cicatricial pits alone remain. In malignant cases as in other acute specific fevers profound prostration with delirium, convulsions and coma may appear, and also hæmorrhages—symptomatic purpura, *i.e.*, extravasations of blood as a symptom of the small-pox poison.

Erysipelas, pyæmia, laryngeal œdema, pneumonia, bronchitis, boils, ulceration of the cornea and destruction of the eye—all due to septic processes may be complications or sequelæ. Albuminuria is not uncommon. Infancy, old age, alcoholism, non-protection by vaccination, fearfully increase the mortality. Abortion is the rule in pregnant women.

In varioloid the abdominal erythematous rash is most common, and the secondary fever and pocks are slight.

Too much fresh air is impossible in the treatment of small-pox—thorough ventilation. The itching of the skin is best relieved by giving opium or bromides internally, and using powdered boric acid and starch locally.

Plenty of milk, beef-tea, broths and farinaceous foods are required. All scabs and dressings must be burnt. The typhoid state is to be treated as it would be in any other disease. Cold affusions to the head, the child being put in a warm bath, is good treatment for the convulsions of any acute specific fever.

During desiccation the scabs should be soaked in oil to loosen them, and baths are useful.

VACCINIA.

Cow-pox is probably small-pox modified by occuring in the cow; the udder and teats are the seats of vesicles and pustules.

The lymph for vaccination may be obtained from the calf, or from the clear, not blood-stained, vesicle of a human being; it is often preserved in Husband's capillary tubes or dried on ivory points.

Infants are usually vaccinated at the age of two

months in the skin over the deltoid; a series of parallel longitudinal and cross scratches into the rete mucosum should be made, blood not being drawn, and the lymph then rubbed into the furrows. When calf lymph is used—as at the Lamb's Conduit Street station—five inoculations are made so as to give the shape of an Italian cross.

Papules arise on the third day, umbilicated vesicles on the sixth, an inflammatory areola surrounds the clear vesicle on the eighth day when lymph may be drawn for vaccination; the vesicle becomes a pustule by the eleventh day, and the pustule dries up on the fifteenth day, but the hard dark scab takes ten days before it falls off, leaving a depressed scar which is more or less permanent.

When calf lymph is used the process is apt to be more severe, the constitutional disturbance being greater and the axillary glands more swollen.

Erysipelas and suppuration occasionally occur. Syphilis has been transmitted by vaccination even when, it is said, blood has not been mixed with the inoculated lymph.

The vaccine vesicles must be prevented from being scratched or from getting contaminated by dirt.

VARICELLA.

CHICKEN-POX is common in children. The incubation period is often two or three weeks. The eruption is very characteristic, being pearly looking oval vesicles common on the back, scalp and mucous membranes of the soft palate and mouth; it comes out in crops of variable number; the vesicles dry up in the centre and get thus umbili-

cated; only slight fever and slight inflammatory areola around the vesicles are noted as a rule. Each vesicle runs its cycle in about five days, leaves no pitting behind, but staining may remain some days. Occasionally in debilitated or phthisical children ulceration or gangrene around the vesicle may occur and lead to hæmorrhage. The eruption must be kept clean; a little starch powder is useful.

IDIOPATHIC ERYSIPELAS.

The Rose or St. Anthony's fire may begin first with the red blush having sharply defined border, or fever with constitutional symptoms may be the first sign. A chill or rigor is not uncommon; local sensations of heat or itching in the skin about to be inflamed are frequent. The face and head are common seats of erysipelas in medical practice. The signs of local inflammation are marked hyperæmia with a variable amount of exudation and sometimes bullæ. There is considerable desquamation after its subsidence. Suppuration, ulceration or gangrene and their consequences may occur.

Erysipelas often tends to spread or migrate to other parts metastatically, and to relapse. The fever is apt to be severe, a typhoid state is not uncommon, and a crisis is often the end of the case. An average duration is a week or ten days. The lymphatic glands corresponding to the area affected are inflamed.

In severe cases it can hardly be mistaken for acute eczema or erythema. It may spread into the mouth and larynx, causing œdema of the glottis, and the deep cervical tissues may become inflamed—phlegmon (Angina Ludovici).

Meningitis is said to occur sometimes, but the

coma and convulsions are often explicable on the theory of a severe toxæmia. Many cases recover even when severe.

A supporting plan of treatment of the usual kind (*see* Typhoid fever) with local applications are the requisites. Exclusion of light and air by cotton wool pads or white paint, or glycerine of belladonna, or starch, or fomentations. Large doses (20 drops t. d. s.) of the tincture of perchloride of iron with gentle saline aperients.

GLANDERS AND FARCY.

The specific virus comes from a horse, and those who have to do with horses are the subjects of these affections. It is called Glanders when the disease is acute and general, inoculation occurring through the air passages; Farcy when inoculation occurs through a cutaneous absorption, when the affection is more prone to be local and chronic. Farcy buds or buttons composed of small round cells may appear all over the body, the skin and mucous membranes are favourite seats. Abscesses and ulcers form from their disintegration, whilst inflammation spreads around these localisations.

These diseases are practically a variety of pyæmia. The nasal mucous membrane often first shows signs, and the ozæna is dreadful in its severity, in its discharge, and in the odour which arises therefrom. In severe cases the symptoms are just like those of severe confluent small-pox, and the complications and sequelæ are pretty much alike. The lymphatic glands naturally suffer along with the skin. Unless in chronic form the disease is most often fatal. The plan of treatment is like that for severe confluent small-pox. The disease is believed to be due to a bacillus something like that of tuberculosis.

YELLOW FEVER.

Yellow fever is a disease of hot climates and is endemic in certain places; it ceases to appear at higher altitudes than 2000 feet, also if the temperature of the atmosphere sinks below 72° F., and in many respects it is like severe ague.

The chief symptoms are related to the stomach, liver, and spleen, these organs being swollen and tender; jaundice and vomiting are common.

As in all severe toxæmias hæmorrhages occur from various parts: "black vomit," epistaxis, petechiæ, and purpura in severe cases.

The mode of onset is sudden, with chills; fever is high, typhoid state and brain symptoms common. These compare with the signs of malignant acute specific fevers. Quinine is not curative of yellow fever.

The treatment consists in feeding the patient, and in relieving the symptoms (*see* Vomiting, Hæmatemesis, Convulsions, Coma, and Fever).

CEREBRO-SPINAL MENINGITIS.

Often occurs in sporadic form as well as in epidemics. The morbid anatomy, physical signs and symptoms are those of acute meningitis (*q. v.*) affecting the spinal cord and base of the brain. Onset sudden with rigors or chills and high fever, even hyperpyrexia, especially at death; headache, retraction of the head, severe pains about the limbs due largely to implication of the nerve roots in the inflammation; hence also herpes on the face and lips or elsewhere, and also probably the petechiæ, purpura, and erythemata, which appear within a week of the beginning of the illness. The usual brain symptoms obtain with obstinate constipation.

The diagnosis from acute rheumatism with high fever, from typhoid fever with constipation and from tuberculosis is not always easy; when the case becomes chronic, the signs often resemble abscess of the brain. Pus is often found at the base of the brain after death. Not uncommon are deafness from implication of the auditory nerves and cochlea with lymph effusion, also blindness from similar causes; water on the brain from blocking of the foramen of Majendie, or pressure by organised lymph on the veins, and brain symptoms ascribed to interference with the nutrition of the brain from chronic meningitis. Death often occurs. The treatment is like that for acute meningitis.

MALARIAL FEVERS.

Marsh miasm means malarial poison. The miasm may be a chemical, physico-chemical, or bacterial poison; probably the last and perhaps it is the bacillus malariæ, shining spores of long oval shape, producing intermittent fever in dogs when injected under their skins and found in the blood of human beings suffering from ague. The poison is inhaled into the blood by way of the lungs, perhaps it enters through the stomach and skin also. A proper degree of porosity, of temperature, and of humidity of soil favour the growth of the miasm, and decaying vegetable matter is preferred by it. It flourishes therefore in marshes and swamps, in deltas, on alluvial soil and the banks of tropical rivers, all of which places afford at certain seasons the proper degree of everything favourable to its luxuriance. The miasm is heavier than most gases, and scarcely floats six feet above the ground; it may be wafted some distance by

winds, but mountains hold it back, rivers or water drown it, and belts of trees, especially the eucalyptus, destroy its efficacy. From all this it seems it is a local evil genius, and therefore endemic. It is not like typhus for it is not contagious, nor is it protective, it is more like rheumatism from its liability to come again, and from its stamping its mark on the protoplasm, so that once malarial the victim is always malarial, and further his subsequent new disorders may be tainted by it and rendered periodic. *Ague cake* is the name of the permanently large spleen resulting from malaria, and is associated with malarial cachexia of which melanæmia and anæmia are the chief signs. Melanæmia may blacken the brain, the liver, the lymphatic glands, the mucous membranes and the skin, and the black pigment, giving the name to it, may occur in isolated particles, or massed together or included in white corpuscles; one form of chronic atrophy of the liver may result from it.

INTERMITTENT FEVER.—AGUE.

Symptoms.—A genuine fit of fever occurs at regular intervals, like epilepsy it may forewarn its sufferer by a feeling of depression, or may not. Cold, hot, and sweating stages are the three chief periods, and in the order mentioned, for sweating never comes first. The cold stage is a rigor with mounting temperature. In any rigor the temperature always rises inwardly, the goose-skin develops, the surface being cold and pale or blue. The arteries are tight, the blood tension raised, pulse regular but frequent, respiration shallow and frequent with other symptoms of fever; the urine is irritating, as witnesseth the frequent passage of it, copious and watery, but of high specific gravity

from excess of urea, the excess bearing some proportion to the rise of temperature. This rigorous stage lasts about one hour, and the temperature reaches frequently 105°. The hot stage is the reaction from the cold stage, and the skin becomes hot and full of blood in a gradual manner, so that the surface gets red, dry, and hot, the breathing deeper and more frequent, the pulse bounding, soft, and frequent, also the cerebral cortex gets flushed with blood, hence the excitement and perhaps delirium. Thirst is a necessary consequence of the enuresis and fever. Now the urine grows scanty and darker, and intensely acid. The hot stage lasts four times as long as the cold. With the sweating period, the skin breaks out first with sweat on the face, the temperature commences to decline, the symptoms abate, the urine diminishes and lets fall urates, the cerebral cortex goes to sleep, as after epilepsy, and the stage ends usually in two or three hours by which time the fever has gone.

In *quotidian* ague the fit repeats itself every twenty-four hours, generally punctually at the hour of the clock, but sometimes it is an hour earlier or later, and by such means a quotidian may be transformed into a *tertian*, which is characterised by a fit every other day, and the *quartan* by a paroxysm every seventy-two hours. The quotidian is the most typical paroxysm, is only seen in perfection in certain parts and certain times, for the cold stage may be slight, and in children both this and the sweating may be undeveloped. The chloride of sodium is increased, and the phosphates diminished in the urine. Scarlet like rashes have been seen in the fever stage in children.

REMITTENT FEVER.

In this ague the temperature does not intermit, but only drops somewhat; the cold and sweating stages are therefore poorly developed, but the hot stage is longer than in intermittent fever, and may last more than twelve hours. The liver swells up more and remains longer congested, and the stomach sympathises, whence vomiting and jaundice are likely symptoms, and the "typhoid" state often sets in with its dry brown tongue, muttering delirium, and perhaps coma; so the fever is protracted for a week or two weeks; the law of temperature makes its influence felt in the morning remission. This fever approaches to the continued type and is correspondingly serious. The prognosis is more favourable the more marked the remissions.

Treatment.—In the cold stage, hot water bottles, blankets, and hot bland liquids like barley water and linseed tea are required with a dose of brandy and a Dover's powder or powdered opium. In the hot stage, cold drinks and ice to suck, tepid spongings, plenty of fresh air, and light covering, are the requirements.

During the interval between the attacks, or in the remissions, quinine must be given in large doses of twenty grains either just before the fit or in divided portions at intervals; it may be floated on milk, swallowed in a gelatin capsule, inserted as a suppository into the rectum, or disguised in glycerine and milk; tannate of quinine may be injected in doses of a grain or less under the skin, the solution and syringe being previously warmed. If the complexion be sallow and the liver or spleen swollen and tender, quinine should not be prescribed, but a blue pill and a black draught of

senna and epsom salts should be ordered; when the tongue becomes clean, and the visceral enlargements subside, then quinine or arsenic may be employed. Fowler's solution should be prescribed in five to ten minim doses three times a day, especially for the more indefinite malarial attacks, it may be given with steel wine or alone, or with glycerine, it may be combined with other tonics such as the lactophosphate of lime and iron.

DIPHTHERIA.

Two views are prevalent as to the mode of working of the diphtheritic poison; according to some, micro-organisms fasten on to the mucous membrane of the throat and set up changes resulting in fibrinous exudation and inflammation; whilst according to others, a toxæmia is the first stage, and this chooses for its local point of manifestation the tonsils and surrounding soft parts. The diphtheritic false membrane may attack wounds, or other mucous membranes than those mentioned, as the nose, larynx, vagina. Similar false membranes may be seen in scarlatina, and some have thought the two diseases may coexist in the same patient. Diphtheria tends to recur and relapse, scarlet fever has little tendency to do so; the larynx is prone to become affected in diphtheria, not in scarlatina; albuminuria is common whilst the throat is bad in diphtheria, but is rare with the bad throat of scarlatina; albuminuria is the common sequel of scarlatina, paralysis the common sequel of diphtheria.

As a rule diphtheria sets in gradually with languor, restlessness, drowsiness or headache; then the throat becomes sore and a whitish deposit may be seen thereon, whilst the glands at

the angles of the jaw swell and become tender. In children especially the throat may not be complained of, and there may be no difficulty in swallowing; in these respects it contrasts with quinsy. The whitish deposit tends to spread, or several spots coalesce and the false membrane may assume an ashy appearance or become dark colored. If this be removed a fresh layer forms on the raw often bleeding surface. If the membrane be cast off by nature fresh deposits may form but are then generally less thick and tenacious and more filmy.

In diphtheria the exudation is prone to spread on to the soft palate and uvula, or separate patches may develop there. The larynx is involved, if at all, generally before the end of a week from the beginning of the illness. The nose is liable to be affected by spread along the back of the soft palate. Salivation and offensiveness of the breath are common symptoms. Ulceration and even sloughing of the mucous membrane may occur. The fever at first is not high and need never be so, pain is usually slight, prostration is often extreme. In severe cases bleeding may occur from the nose, mouth or bronchi, purpura may develop, a blush may be seen over the chest, or erythemata may appear. Albuminuria is common, may be very great; sometimes fibrinous casts are present, but rarely blood. Tough clots are apt to form in the heart causing sudden death; or syncope may result also apparently from weakening, sometimes due to myocarditis, of the heart muscle. The fluids may regurgitate through the nose, or they may cause choking, vomiting and a slow pulse may set in, and these symptoms have been regarded as due to palsy occurring whilst the throat is still bad, which, however, is not the rule.

Convalescence is often slow; the knee-jerk often lost even when no other sign of paralysis

occurs. The albuminuria generally disappears; much anæmia may remain. After a variable interval, but usually not longer than six weeks, paralysis may supervene; the soft palate may never have recovered; deglutition may become or have remained difficult. Squinting, paralysis of accommodation for near objects, weakness of the legs, arms and neck, defects of colour vision, disordered sensation, ataxic gait or severe neuralgia are some of the chief symptoms of diphtheritic palsy. The knee-jerks may be exaggerated before they are lost, and they do not usually return till at least sixteen weeks from their disappearance.

Diphtheria is not very contagious, appears to be often due to bad drains and dampness with unhygienic surroundings. The treatment consists in supporting the strength of the patient by rest in bed and nourishing diet with stimulants if necessary. Local treatment of the antiseptic kind is most valuable. Syringing, gargling with almost any antiseptic wash should be practised frequently. A spray of bicarbonate of soda and water gr. x. to ʒj. tends to loosen the membrane. Iodoform powder blown on with an insufflator is very useful. Perchloride of iron and quinine are the best and most generally useful medicines.

The paralysis is best treated if severe by keeping the patient in bed. If deglutition is difficult solid boluses of food should chiefly be the diet; the patient may be fed by a soft catheter; zyminised suppositories or nutrient enemata may be prescribed. Belladonna and strychnia are the most useful remedies for serious paralysis from which not a few children have succumbed.

MUMPS.

After incubating for two or three weeks this morbid process manifests itself locally as an idiopathic parotitis, the parotid gland swells up rapidly with sometimes considerable disturbance of the brain. As a rule, however, the initial fever is slight, 101° F., and the febrile symptoms are correspondingly mild. The disease in many cases subsides, only one parotid having been affected, in a week or ten days. Sometimes the submaxillary glands become swollen, and this may happen after the parotid swelling has reached its height. As the swellings come suddenly so they may subside almost as rapidly, and it is curious that this rapid subsidence may betoken the development of an equally rapid enlargement of another salivary gland, or of the testicle, mamma or ovary. There may suddenly supervene intense nervous excitement, delirium, even convulsions, and this may disappear at the outbreak of the local inflammatory swelling; rarely such severe cerebral and febrile movement is the precursor of a paralysis, generally a hemiplegia, resembling that variety which Strümpell regards as due to a poli-encephalitis of the motor region of the brain akin to the anterior poliomyelitis of the cord.

Whether the inflammatory parotitis always causes cessation of the salivary flow from the affected gland does not seem certain.

Atrophy of the testicle has been noted after the metastatic orchitis, especially it is averred in soldiers.

The inflammatory glands though attended with surrounding œdema, practically never suppurate but almost always resolve. The kidney is occasionally involved. The disease is highly infectious,

and an infected subject seems liable to spread the contagion for two weeks from the onset of the swelling.

Face-ache and the swelling evidently of the salivary, not the lymphatic glands, attended with a sensation of stiffness and difficulty of yawning, mastication and articulation, are the main symptoms. Rest either in bed or in one room, a simple purge and a saline draught, and local fomentations with glycerine of belladonna, may be followed by cod-liver oil and steel wine, should debility and anæmia arise as is sometimes the case.

WHOOPING COUGH.

After incubating two or three weeks pertussis sets in with a spasmodic cough and some fever—often 101° F. or more—the catarrhal stage which lasts about ten days. The cough is apt to be worst at night-time, and tends to become paroxysmal (convulsive stage): many powerful expiratory acts, making a series of short coughs, before an inspiration occurs. Two weeks or more may elapse before the long drawn inspiration makes a whooping sound, and during this period vomiting, epistaxis, bleeding into the conjunctivæ, from the mouth or nose, may point to the nature and severity of the affection. Some bronchitis and tracheitis is always present, and may, especially in infants and feeble children, develop into broncho-pneumonia; this is often the case, when as so frequently happens, whooping cough follows soon after measles in the same child. An ulcer of diphtheritic look, on the frænum of the tongue during the early stage, is very common; the face is generally puffy, but albuminuria is, however, seldom present in mild cases.

Whooping cough is undoubtedly contagious,

and the pearly phlegm generally ejected in large quantity with each fit of coughing probably contains the contagium; in it bacilli have been found. The paroxysms of coughing have been attributed to an affection of the vagus nerve stimulating the respiratory centres to such abnormally explosive discharges; some attribute this vagus irritation not to the laryngeal inflammation, but to swelling of glands in the mediastinum.

Similar fits of coughing to those of pertussis have been associated with large mediastinal glands and tumours, and also with large empyemas in which a vagus irritation might easily have arisen; in such empyemas treated by drainage, the cough has generally ceased on the reduction of the distension due to the pent up pus.

The convulsive stage lasts about a month in severe cases, after which the disease declines, the paroxysms becoming fewer and less severe; vomiting, however, may continue as the effect of habit, and also as the effect of habit, the liability to paroxysmal coughing may remain for many months, so that any simple catarrh may provoke the spasmodic often clanging cough. The catarrhal stage is best treated by confinement to bed or one room, by saline purgatives and diaphoretics, with a mixture of carbonate of ammonia and ipecacuanha; and turpentine liniment may be rubbed into the front and back of the chest night and morning. In the paroxysmal stage any antispasmodic may be used, bromide, belladonna and prussic acid being the best; a spray of carbolic acid three or four times a day is also useful.* A change of air and tonics best complete the cure. Vomiting should be combated by iced milk, soda water, or koumiss, and the food should be given cold or iced in small quantities frequently.

* See the Author's *Treatment of Disease in Children*: Lewis.

ASIATIC CHOLERA.

ASIATIC CHOLERA setting in suddenly in the early hours of the morning like asthma and gout, this disorder characterised by tempestuous vomiting and diarrhœa, tends to drain off all the fluid parts of the blood, to stop the flow of urine, and to arrest the various secretions of the body. The mind is often singularly apathetic not realising the dangerous state, perhaps because the diarrhœa and vomiting are so painless. Severe cramps chiefly in the calves of the legs and belly, by no means painless, are important symptoms. The goose-skin, shrunken livid and pale, indicates the great collapse which is attended also with spasm of the various arteries, and other plain muscular tissue throughout the body. The arterial and intestinal spasm is perhaps partly the result of the blood being drained of its fluids, partly may be the effect of the cholera poison on the vaso-motor and other nervous mechanisms. Notwithstanding the coldness of the skin and extremities the internal temperature is all the while rising, and the rectum may register 103° F. or more.

The stools and vomit at first show signs of the usual contents of the intestines and stomach. Rapidly the vomit becomes bilious, and the stools pale and of the aspect of rice water; until upwards and downwards the ejected material presents similar appearances. During this *algide* stage as it is termed, the *vox choleraica* may be observed in the whispering unnatural character of the voice. The *facies choleraica* is composed of the sharp pinched features, the muddy looking complexion, sinking of the eyes, flattening of the cornea, and dark blue areola at the margins of the orbits. Death may occur within twenty-four hours. It

may be due simply to the collapse. Signs of amendment may set in, reaction as it is called, but even then death may happen from uræmia due to suppression of the urine, headache, drowsiness, convulsions and coma being the signs. The reaction may proceed to considerable fever and the typhoid state may set in; at any stage recovery may occur.

The stools contain much epithelium, are highly albuminous and have much saline matter, chiefly common salt; they approximate to the composition of blood serum.

The poison of cholera is probably taken into the system with drinking water, but the poison can only operate in certain states of the system; just as with other specific fevers. Whether the poison is ever conveyed by the atmosphere into the lungs, or gains entrance through the skin is questionable. Filth, poverty and generally bad hygiene favour the production and propagation of cholera. Epidemics certainly follow the lines of human intercourse, but quarantine seems to have no power of preventing its entrance into any country.

It is important to check any diarrhœa in any individual who is in the midst of cholera. Damp dwellings favour it; high and dry situations are generally protected. A certain degree of moisture appears to be essential for its growth in the soil just as with malaria; too much wet or insufficient humidity seems to check the spread of an epidemic. Fresh stools are not capable of giving the disease, but only after they have become stale and undergone certain changes; the rodents are liable to cholera, but Dr. Sanderson showed that the stools from human beings do not give cholera to rodents unless they had been passed some time.

Cholerine or choleraic diarrhœa merely signify

slighter forms of disease occurring in the same epidemic and attributable to the same poison (? comma bacillus).

Mere swelling of the mucous membrane and Peyer's patches with patchy congestion and occasional ecchymosis may be found after death. The blood may be dark and tarry looking; the voluntary muscles contract so strongly after death that some have believed life not to have been extinct; the rectal temperature may be very high after death.

The preventive treatment consists in supplying pure boiled and filtered drinking water and milk, and removing bad hygiene.

Vomiting must be abated by ice and soda water, or small doses of iced beef-tea or mutton broth may be borne. A dram of brandy in water and a grain of powdered opium may prove invaluable to arrest diarrhœa and vomiting. Counter-irritation by mustard or hot fomentations to the abdomen, and hot bottles round the patient are good. During the stage of reaction light diet and the usual fever treatment are the requisites; plenty of simple whey and well salted beef-tea are valuable for replacing the salts ejected with the stools and vomit.

In the profound algide stage a transfusion of simple saline solution at a temperature of 98° F. should prove good treatment.

MALIGNANT PUSTULE—ANTHRAX.

Woolsorters, tanners, hide dressers and others who deal in skins, are liable to a remarkable form of blood poisoning, due to inoculation of some part of the body with the bacillus anthracis—a micro-organism which flourishes in the blood and

other tissues of the body of man, sheep and other animals. The spores of this bacillus wonderfully resist the action of heat and drying. The skin or any part of the mucous tracts may be the point of inoculation. On the skin this organism sets up at the site of inoculation a sort of hard boil with a black centre; if this malignant pustule is cut out further infection may be prevented. But the lymph and blood streams may be invaded and the bacilli develop therein causing œdema, congestion and ecchymoses partly by mechanical obstruction, the bacilli being cultivated, so to speak, in the capillaries.

Ulcers and sloughs may be formed in the intestines, and the symptoms may resemble severe typhoid fever.

One case seen by the author occurred in a tanner, aged forty, on whose neck the characteristic boil was detected, though it had not troubled the patient.* When first seen the man was convulsed and comatose with stertorous breathing; here it was probable that the bacilli had invaded the cerebral vessels and produced the symptoms.

The bronchi and lungs may be the chief seats of disease.

THE PLAGUE.

The plague is a violent form of blood poisoning, doubtless due to a specific living virus; in many ways it reminds one of anthrax; buboes, especially at the groins and axilla, are the chief local manifestations. The symptoms are like those of typhus fever; a typhoid state is common; hæmorrhages anywhere and severe nervous symptoms recall the effects of other malignant acute specific fevers and toxæmic poisonings. Carbuncles may appear on the limbs. With these remarks it is easy to

* *The Lancet*, vol. ii., 1887.

imagine the kind of illness and the kind of treatment required.

RABIES—HYDROPHOBIA.

Rabies—hydrophobia is a disease due to a special probably living poison which flourishes in the medulla and spinal cord of dogs, and is also found in the secretions of the mouth. Man usually obtains the contagium from dog, cat or wolf, some saliva being directly inoculated at the wound made by the teeth of the rabid animal.

The incubation appears to take a very long time, usually not less than four to six weeks, sometimes much longer. The poison then spends its force chiefly on the medulla, which part of the nervous system it finds most congenial to its qualities. Perhaps it reaches the medulla along the nerves directly. Curious sensations may appear in the cicatrix of the bite, but often the first symptom is to be referred to the influence of the virus on the vagus centre and nerves, a feeling of oppression about the chest, choking in the throat, uncomfortable epigastric sensations, reminding one of epilepsy; an alteration of the feelings, also undue cheerfulness, or more often despondency or a fear or dread of something being wrong, increases the resemblance to pure nervous diseases. Drinking becomes difficult. especially of fluids, the muscles of deglutition and respiration tend to go into spasm, sometimes without obvious cause, but due no doubt to the irritation of their nerve-centres in the medulla by the poison. It is generally asserted that the whole of the senses of the body are hyperæsthetic; certain it is that almost any afferent impression excites spasm. There is most remarkable mental terror and agitation. The treatment is like that for tetanus.

DENGUE—DANDY FEVER.

Breakbone fever is something akin to rheumatic fever and prevails in epidemics in hot climates.

After a short period of incubation the symptoms begin suddenly with chills and pains in the back and limbs, swollen joints and the usual signs of moderate fever. Like rheumatism erythematous rashes having no special seat may appear. The lymphatic glands and testicles may swell painfully. In a day or so the symptoms abate, but appear again in a few days, and a fresh eruption either erythematous or purpuric and sometimes inflammatory may develop. Much debility and anæmia may remain. Emetics and purgatives are recommended; otherwise the treatment is like that of any fever. Hot local applications should be suggested for the pains and swellings.

Section III.

GENERAL DISEASES.

ACUTE RHEUMATISM—RHEUMATIC FEVER.

Since pains are the most ordinary symptoms of rheumatism, it is no wonder that the chief difficulty in discussing rheumatism is to define what we mean by it. Given any pain, it may be rheumatic, or it may be due to many other causes, how are we to determine the rheumatic nature? Shall we say, that is rheumatic pain which is increased by movement; if so, we shall certainly include many pains which are no more rheumatic than those

dependent on spinal cord disease and neuritis, and we shall exclude some pains, when other associations would seem to prove them rheumatic. And so we may argue all round with the various symptoms of rheumatism. Mere metastasis or shifting quality of pain is not confined to rheumatism, but perhaps a swelling of the joint having this erratic quality may stamp it as decidedly rheumatic.

Rheumatism is held to be a blood poisoning by acid or "fatigue" products, the result of imperfect metabolism and imperfect excretion. Cold and damp excite the disease, but the kind of individual has some influence; this "habit of body" may be acquired or hereditary. Injections of lactic acid into the peritoneum of animals has been followed by the appearance of endocarditis, sclerotitis and metastatic joint inflammations; therefore some believe the acid to be lactic acid. The saliva is acid, likewise the profuse sweat, and the urine is very acid also. So there is some reason for believing in the acid theory, but not much for saying lactic acid.

Rheumatism attacks chiefly tissues of mesoblastic origin, especially the fibrous and serous structures including those of the nerves. It should never be forgotten that erythemata and urticaria, mere capillary lesions of the skin, are also frequently rheumatic. Vesiculate erythema (hydroa) is often rheumatic, and purpura is sometimes also. Rheumatic subcutaneous or fibrinous nodules are overgrowths of delicate fibrous tissue, usually painless and often not noticed by the patients; their size varies from a pin's head to an almond; the skin over them is movable, and they are not attached firmly to the fibrous structures beneath; their most frequent sites are the points of the elbows, the patellæ, the malleoli, the vertebral spines, spine of the scapula, the line of the clavicle, crest of the ilium, extensor tendons of the hands

and feet, the peroneal tendons, the pinna of the ear, the temporal ridge and fascia, the forehead and the superior curved line of the occipital bone; their number varies from one to many; they may come and go quickly in a few days, or may persist with or without much change for weeks and months together. They occasionally complicate joint swellings. Rheumatism in children is often of straggling course, and the links of the rheumatic chain may be separated by long intervals; in children a greater frequency of erythemata, nodules, endocarditis, pericarditis and chorea may be noted, whilst there is often little arthritis, pain, pyrexia or sweating.

The joints and tissues around are congested and œdematous, and the internal surface loses its natural polish; the synovial fluid becomes increased in quantity, less viscid, more turbid, and flakes of lymph accumulate. Suppuration practically never occurs, and if it did, the diagnosis should be doubted. Tendon sheaths and synovial bursæ may be affected similarly.

Symptoms.—Fever varying from 100° to 103° or so, profuse acid sweats, metastatic or erratic arthritis, shifting pains in the limbs and joints, with much feeling of illness and restlessness (loss of nerve tone), and loss of hæmoglobin and red disks, are the general symptoms. The larger joints are most frequently affected, the skin over them in part is pink, not scarlet, there is some tenderness, and active movements are not performed owing to the excruciating pain caused by an attempt to move the inflamed joint.

Rheumatism is a common cause of hyperpyrexia, which may develop at any period of its course, and its earliest signs are often disappearance of the pain, of the arthritis, and of the sweating, with increased restlessness and delirium. Cerebral rheumatism, in which convulsions and coma con-

stitute the central signs, is probably always attended with hyperpyrexia and apparently due to it. Pneumonia and pleurisy are complications, but occur less frequently than pericarditis and endocarditis. Meningitis may complicate, but this must be rare, and perhaps the case was meningitis all along and not rheumatism, for we must know that shifting pains and even joint pains and swellings may occur as the result of meningitis.

Stiff-neck and tonsillitis are sometimes rheumatic, and may occur at any period in the chain of rheumatic phenomena.

Rheumatism is erratic in time and space, relapsing and recurrent are adjectives applicable more to it, perhaps, than any other disease.

Its duration varies from one to many weeks, and its intensity and course may be likened on the one hand to the rapid intermittency of faradisation, and on the other to a constant and varying intensity of the galvanic current. No disease presents more variety of course. The prognosis is generally favourable under treatment, but the outlook is gloomy if the cardiac valves have become inflamed. The worst danger is hyperpyrexia.

Treatment.—Rest in bed, with milk and farinaceous food, and plenty of bland fluids to drink such as barley water and weak linseed tea, are most important. Alcohol is rarely necessary. If there be pain, pyrexia and much arthritis, salicylic acid or salicylate of soda should be prescribed in large doses. The alkaline treatment is the best if the specific do not succeed. Bicarbonate of potash or soda may be given, large doses of one drachm every few hours in soda or potash water or in an effervescing citrate of ammonia or potash draught; the imperial tartrate drink is also good; the urine should be kept alkaline and the bowels opened regularly. Pain may be relieved by Dover's powder or solid opium if not by salicylates. The

joints may be wrapped in cotton wool or flannel, and covered with oil silk, so as to encase each joint is a sort of vapour bath. Sponging or bathing the skin in warm water, impregnated with bicarbonate of soda, is good practice, and diminishes the sour smelling perspiration.

Bleeding is rarely required, for the blood tends to get anæmic, and is hyperinotic, nor is blistering of service, but a leech or two or a blister may prove beneficial when the pericardium is inflamed and there is much pain and distress.

Sugar, meat and eggs should be interdicted in acute rheumatism, for the first increases intestinal acidity, and the metabolism of the others are believed to be interfered with in rheumatism.

CHRONIC RHEUMATISM.

This is sometimes the outcome of acute rheumatism, but frequently a separate affection of its own kind. The joints, nerves, fasciæ, aponeuroses and periosteum are the seats of the affection (*see* Muscular rheumatism). The pains are often worse at night preventing sleep, or in the day destroying all pleasure. Dampness, as a rule, makes the pains worse, but cold may relieve or aggravate; generally dry warmth appeases the distress. Syphilis and indigestion appear to be causes, but even when not, iodide of potassium and attention to the diet with the administration of rhubarb or gentian and soda or potash alleviate suffering. Guaiacum, turpentine, sulphur and liquor potassæ are sometimes useful; the general treatment should be like that for muscular rheumatism.

Chronic articular rheumatism may be complicated with chronic valvular changes in the heart; the joints grate and creak on movement.

GONORRHŒAL RHEUMATISM.

GONORRHŒAL rheumatism consists in swelling of joints, often of the knee, having a tendency to disorganise the structures by its persistence; the gonorrhœa may still be present or have passed by; the pathogeny is probably blood-poisoning.

This form is credited with the power to produce multiple anchylosis of joints including spondylitis deformans.

MUSCULAR RHEUMATISM.

A PAINFUL tender affection of the fibrous structures and connective tissues of muscles attended with spasm of the genuine muscular tissue. The pain is developed by the slightest movement and by pressure on the muscle affected. There may be slight fever and indigestion, but often the affection seems strictly local. Such muscular rheumatism may be present at the onset of acute rheumatism and in gonorrhœal rheumatism. The rheumatic protoplasm, exposure to cold and damp, sprain and strain of the parts are the chief causes.

The affection has some tendency to subside of its own accord, but it may last many days and even weeks together. Spinal diseases may cause similar affections of muscles.

Varieties:—Stiff-neck, often called acute wry-neck and sometimes *caput obstipum*, is frequent in young subjects and remarkably recurrent, the sterno-mastoid and splenius are most affected. Pleurodynia is "rheumatism" of the fibrous tissues of the chest wall; the strain of coughing may develop it; usually unilateral, a tender spot may be found generally at a point of insertion of the serratus or

pectoralis major, or in one intercostal space; the pain is always evoked by respiration.

Lumbago is the name given when the fibro-muscular tissues of the loins are the seat of the rheumatism; every movement and pressure increases the pain; there may be slight fever. Great care is required not to overlook grave diseases causing lumbago: so spinal caries, renal disease, especially pyonephrosis and calculus, inflammation of the bowel, aneurysm, rectal, uterine and vesical disease, together with spinal cord disease and meningitis, should be remembered. Hip joint disease, lameness, sciatica, gout and gonorrhœal rheumatism are other causes of simulated lumbago.

Other varieties are cephalodynia, when the scalp, and dorsodynia or omodynia, when the shoulder structures are affected.

The diagnosis requires care to distinguish it from neuralgia, which is paroxysmal, unilateral, has very limited *points douloureux*, and is less influenced by movement.

The prognosis is improved by careful treatment, but relapse is common.

Treatment.—A hot air or Turkish bath may at once relieve the fever and local pains. Alkalies and diaphoretics accomplish the same ends. Quinine and iron may be needed if there is debility. Iodides are sometimes valuable, especially the syrup of the iodide of iron. Sugars, much meat and eggs should be avoided. Plenty of friction with turpentine, aconite or chloroform liniment, belladonna plasters, flying blisters, sinapisms, hypodermic injection of morphia or cocaine, the galvanic current and gentle shampooing are the most valuable local methods after rest has been secured for the tender muscle (*see* also Rheumatic arthritis).

RHEUMATIC ARTHRITIS.

Rheumatic arthritis or rheumatic gout comprises many varieties of chronic affection of joints, but it excludes any in which a deposit of urate of soda occurs. Swelling, stiffness and deformity, with wearing away of cartilage at the centre of the joint, and increased formation of the same and of bone around the periphery, are the chief features. The knee-jerks are not lost but generally increased, even when the knee-joints are affected.

It may come after acute or chronic rheumatism, but often has nothing to do with either, being an independent affection of different, if unknown, origin. We must recognise a many-jointed form occurring in middle aged women often before and after the climacteric period. Any cause of ill-health, but especially such as results from overwork or derangement of the genital system are powerful predisposing causes. A fright or chill—as in so many diseases—may be the starting cause of the disease.

The joints are affected in every tissue: often a large effusion, always a chronic multiplication of cartilage cells proceeding to villosities and atrophy, swelling of the synovial membrane, capsule and ligaments, which may become softened and elongated, and later on thickened and calcified. Atrophy and degeneration may overtake all the structures; eburnation may polish the centres of the bones where the cartilage has disappeared, and the articular surfaces may change their shapes, whilst the periphery of the joint may develop "lips," spikes and bosses of bone. The cavity of the joint and of neighbouring bursæ may exhibit loose or pendulous cartilaginous bodies.

As a rule the heart is not affected. Some incline to the belief that the disease originates from

blood change like ordinary rheumatism, others maintain the nervous origin, direct or reflex from the genitals, whilst a few consider it the child of mixed parentage, rheumatism and gout. If urate of soda be present in the joint, it seems to be best to consider the gout as a complication.

Of the symptoms, pains are most important precursors of the stiffness, swelling and deformities, and often the pains are most distressing, especially at night and in concord with changes of weather. The joints may creak and crepitate, as perceived by the patient or doctor. Movement is greatly impaired by the tenderness and by the anatomical changes.

One form of the affection clearly results largely from hard work as seen in washerwomen, chairwomen, and those who do household work; in these the stress of the deformities falls on the fingers, and the chief change is in the phalangeal bones at the joints. In the polyarthritic form, unconnected with hard work, the stress of the complaint first falls on the softer tissues of the joints, and the feet may be fully as bad as the hands.

There may be considerable wasting of the muscles, but the electrical reactions are not lost, reminding one of progressive muscular atrophy. The temporo-maxillary articulation is often affected, and produces noticeable swelling in front of the ears and sometimes with distortion of the chin. Spondylitis deformans is the name given when the disease affects the vertebral articulations, the mobile neck and lumbar regions then get stiff, and the stature of the patient diminishes.

Gastric dyspepsia with much nausea and retching are often prominent symptoms.

There is much nervous depression, diminution of strength and of blood. Sweating of the palms and soles often occurs, but as in acute rheumatism, the skin may fail to transpire.

The course of the disease is often slowly progressive, but it may exacerbate and recede several times in the same patient, the net result of the variations reducing her to the state of a bed-ridden cripple. The disease may apparently terminate before this stage is reached, leaving the patient deformed and debilitated. Death from the disease itself is rare.

The disease differs from gout in the mode of onset of the joint affection, in the absence of tophi and of excess of uric acid in the blood. When one joint is affected, traumatic synovitis, intracapsular fracture (of the hip) and dislocation should be excluded from the diagnosis.

Treatment consists in the employment of baths, attention to alimentation, clothing and sleep, and the giving of alkalies, alteratives and tonics. Turkish baths are valuable, also the baths of Buxton, Bath and Strathpeffer in the fine weather. Foreign spas are also recommended. The climate of Algiers and Egypt suits some cases. Cod-liver oil, iron wine and arsenic should be prescribed. Tincture of actea racemosa, iodide of potassium and iodide of iron are valuable, the first for relieving pain and the others as alteratives. The Jaeger sanitary combination garments and clothing are decidedly beneficial. Sugary wines, malt liquors and any undigestible food should be avoided. Iodine paint, flannel and cotton-wool, mercurial plaster, strapping and liniments may be employed locally.

ACUTE GOUT.

PODAGRA or gout has, like acute rheumatism, a recurring tendency, and each acute attack is less typical than its predecessor. The arthritis is more severe, and more limited to one joint. Fever and digestive disturbance are always pre-

sent. The metatarso-phalangeal joint of the great toe is most frequently invaded, and the foot far more often than the hand, whence we might think the dependent position favoured gout by the comparatively feebler circulation—cold feet are more frequent than cold hands. Symptoms may precede the outbreak in the joint, but such warnings are often wanting, as with epilepsy. The premonitory symptoms may be referable to the heart, stomach, or pleura, the skin may exhibit eruptions, especially urticaria, and the urine may be lithatic.

Like asthma, cholera, complications of heart disease, night sweatings and terrors, the small hours of the morning witness the first attack of gout, which begins with severe burning or throbbing pain in the ball of the big toe and perhaps chilliness. The agonising pain attended with chills and flushes or an actual rigor, abates at dawn, when generally also the skin begins to sweat and the patient falls asleep. A few hours later the region of the joint is very red, tender, shiny and swollen with dilated veins, the tongue is furred, the mind depressed, and the bowels fail to act. The urine is febrile and scanty, and may contain a trace of albumen. A return of the pain next night, and even on the third night at the same time is not uncommon. The attack passes off gradually, and at the end of a week the inflamed skin peels after the œdema has subsided, whilst the mind often seems to have been invigorated by the gouty paroxysm. The attack may not recur for a year or more, but the intervals tend to get shorter. Summer-time generally affords the most immunity.

Chronic gout may be the sequel of many acute attacks and occasionally occurs without such paroxysm. Tophi or chalk-stones may be found in and beneath the skin around the joints and ears; smaller deposits of the urate of soda may be seen

in the skin of the auricles, in the sclerotic, nasal cartilages, and even in other parts of the skin. Debility, anæmia, and neurasthenia may be marked. The red gouty kidney should be remembered. Lead poisoning predisposes to gout, and also to albuminuria.

Sometimes the gouty concretions set up ulceration and suppuration by means of which the urates are discharged.

The joints may become much deformed, and examination after death never fails to reveal the deposit of urate of soda in the cartilage and other structures. Many joints may be deformed, and the attacks are more frequent but less violent.

The veins may become dilated and thickened. Gouty phlebitis may occur, and tends to disappear from one part and appear in another. Cutaneous eruptions are common, also arterial degeneration and Bright's disease.

In retrocedent gout metastasis occurs from a joint to an internal organ, especially the stomach, there is then nausea, vomiting, sometimes of bile and of blood, violent spasmodic pain, and much mental distress. The brain may be similarly involved by retrocession, when the symptoms are intense headache and drowsiness, or even hemiplegia may develop; if the heart receives the retroceding gout, short breath and fainting result; bronchitis, asthma, angina pectoris, and other affections may be of gouty origin.

The causes of gout are excessive eating, especially of meat and rich articles of diet and copious drinking of rich wines or sweet beers and cider, combined with deficient exercise and want of fresh air. Doubtless the constitution of the individual predisposes. Some gouty subjects are of the Norse type, with florid complexions and gigantic frames, others are of the Arab description, light in the bone, thin and wiry and these although

not large eaters may develop gout. Women are much less liable. Most cases begin between thirty and forty years of age.

Pathology.—In gout there is excess of urate of soda in the blood serum. A blister should be formed, and two drachms of the serum placed in a watch-glass, add to this twelve drops of acetic acid, and put in two or three threads of cotton, allow the watch-glass to stand on the mantelpiece in a warm room where little dust enters, until it sets from evaporation in from 24 to 48 hours; then if urate of soda be present in excess, crystals of uric acid may be discovered clinging to the threads of cotton when these are examined by the microscope. During an acute attack the quantity of uric acid put out in the 24 hours is less than normal.

According to Garrod the kidneys are inadequate and the excess of uric acid is due to defective elimination; Murchison taught that the liver made more uric acid and less urea, hence the excess; while Dr. Ord accounts for the uratic deposit as being the result of a mineral degeneration of fibrous and other slightly vascular tissues.

The diagnosis is from rheumatism and arthritis deformans. Gout involves fewer joints and those the smaller ones, especially the great toe, it occurs later in life, in males, the joint is more inflamed, the veins being swollen, the skin red, and œdematous and desquamating at the end of the attack. Periodical recurrence, attacks of shorter duration, and deposits of urate of soda are other features. Acute rheumatism occurs earlier in life, in females and males, the large and medium sized joints are involved, the arthritis is shifting, the skin over the joint is only pink without œdema or enlargement of veins, the attacks are longer than those of gout and not periodic; the joints never contain urate deposits. Rheumatoid arthritis is very rare in

childhood or youth; the smaller joints may be affected, the deformities are fully as marked as in gout, and more symmetrical in the polyarthritic cases; it may be confounded with chronic gout, but there is really no deposits of uric acid, nor does the heart or kidney tend to suffer.

Gout seldom kills directly, but chiefly through its complications. It should be borne in mind that many nervous symptoms of obscure pathogeny may really be due to masked hereditary gout, joints never being involved.

Treatment of an acute attack consists in confinement to bed with the joint raised above the level of the body. A sharp purge with salines and even calomel should be followed by large doses of bicarbonate of potash or lithia in combination with ten drop doses of wine of colchicum. Free drinking of bland fluids and salutaris or lithia water should be encouraged when the attack is violent. Diaphoretics, especially the hot air bath, are useful. Fluid diet is best for two or three days. In the intervals, the diet must be reduced all round, but especially the meats and sugars, also the liquors, gin and whiskey being the least harmful. Warm woollen clothing, plenty of exercise, Turkish baths, avoidance of enervating occupations and of anxiety.

PURPURA.

Purpura as a symptom signifies the occurrence of sanguineous effusions into the different tissues of the body, producing red or blue patches which do not disappear on pressure. The small spots of extravasated blood are named petechiæ, the larger ones vibices or ecchymoses.

Sometimes the only local symptom is hæmorrhage into various tissues, and from the different

surfaces of the body; then it is called the morbus maculosus (Werlhofii), there may be fever, but generally there is none, hence the phrase *petechiæ sine febre* of the old authors. Hæmorrhagic purpura is so named if there is bleeding from a mucous surface, as well as cutaneous blood extravasations. Whether the purpura is due to blood poisoning, to disease of the vessels or to morbid nervous influence is unknown; any of these conditions may cause purpura; experimental stimulation of the pons Varolii in animals has been immediately succeeded by purpuric spots in the different tissues of the body, proving the possibility of the affection being due to morbid innervation. It will be gathered that the hæmorrhages into the internal viscera may cause serious symptoms and even death; the brain, lungs, liver and intestinal canal as well as the gastric and urinary surfaces may yield blood; in fact no tissue is exempt from the petechiæ or larger extravasations. The blood sometimes does not clot, but large clots have been found in the serous cavities of the body.

If long-continued, the disease causes marked anæmia, with a sallow face of waxy appearance, and local œdema of feet; sometimes extensive anasarca occurs, with ulcerations of the nose and of the skin of the feet and legs.

The disease may begin abruptly or gradually; its course is continued by successive crops of fresh extravasations, and its termination in recovery is frequent. The disease leads to depression of nervous strength, and death may consequently result from this asthenia, or from simple failure of the heart's action. Unlike scurvy there are no swollen gums, no history of want of fresh food and generally the cachexia is less evident, but free epistaxis, hæmoptysis, hæmaturia, hæmatemesis and menorrhagia are more marked. Purpura morbillosa, scarlatinosa and the like, are not commendable

terms since any acute specific fever, or any disease of the blood may be attended with symptomatic purpura. Purpura rheumatica may occur in genuine rheumatism, but frequently the only signs of "rheumatism" are shifting pains and tenderness, with an arthritic swelling having no migratory tendency and perhaps in some cases caused by blood extravasation.

Purpura differs from the hæmophily in not lasting for ever, but being a mere episode in, or termination of, the patient's life. It generally differs from a malignant acute specific fever in the absence of a sudden febrile onset. Vague pains and languor with headache may announce the disease, but hæmorrhages are often the first symptoms. Micro-organisms have been found once by Watson Cheyne in the thrombi of vessels at the seat of hæmorrhage but not in the circulating fluids. Fatty degeneration of the heart, liver, and kidneys may be found.

Treatment consists of rest in bed, avoidance ot bruises, and injury; nourishing and fresh food; plenty of fresh air, clean clothing and customary ablutions. If the patient was robust to start with, a free saline purge of Epsom salts or Carlsbad salts, with infusion of senna, should be given on an empty stomach; it may be repeated two or three times. If there is cachexia, then a supporting plan of treatment is advised; stimulants may be needed notwithstanding the hæmorrhage if syncope is feared. Ten to twenty minim doses of the tincture of perchloride of iron may be given in glycerine and water three or four times a day, liquor arsenici hydrochloricus may be combined with it in five minim doses.

Turpentine or terebene in half drachm doses may be given in a gelatine capsule in almond mixture, honey, syrup or glycerine. Half drachm doses of the liquid extract of ergot, twenty grain

doses of gallic acid or tannic acid, three grains of acetate of lead, with a quarter of a grain of opium powder, are other remedies to be employed with caution. Opium is useful to relieve restlessness. As local hæmostatics, ice, hot water, various styptics—perchloride and sulphate of iron, dried alum—and direct pressure should be remembered.

Cleaning the nose and carefully painting the mucous membrane over the turbinate bones with a ten per cent. solution of cocaine are of service in any form of epistaxis.

Purpura neonatorum occurs within the first days of life, and its chief cause is the disturbance in the circulation resulting from the change in site of the respiratory area from the placenta to the lungs. Syphilis may predispose to it, and it may be associated with hæmatemesis, epistaxis and melæna. Free stimulation and warmth rather than cold are required; five drops of brandy in the mother's milk or in water may be given every half hour; crying should be induced.

DIABETES.

Diabetes insipidus is a pure polyuria, the urine being passed in large quantities of a low specific gravity, the total solid contents for the twenty-four hours may not be above the average. Great thirst is the chief symptom. The affection is not uncommon in children, and is usually chronic. Coarse disease of the brain, fibroid changes in the kidney, and hydronephrosis have been found in some fatal cases; but there may be no tangible cause. When urea is discharged in excess the term azoturia is used; and if phosphates are in great excess "phosphatic diabetes"; sometimes the general health suffers but little, at other times

there may be great debility, anæmia, wasting, dry skin and constipation.

The quantity of urine passed is often extremely large, even twenty pints a day.

The transient passage of a large quantity of pale clear urine is common after headaches, epilepsy, megrim, and hysterical attacks. The polyuria of granular kidney is seldom extreme and does not generally go beyond six pints a day.

Diabetes mellitus or mellituria may be a slight affair, as in old fat people, or may be very serious, as is more commonly the case in young adults and children; in the latter, however, a rare disease.

In the former class it is sometimes a symptom of subordinate importance often accompanying a bronchitis with signs of granular kidney and gout; but it may exacerbate, and then what with the excess of sugar in the blood, the albuminuria and the cardio-vascular changes, serious low (or afebrile) forms of inflammation of the serous membranes, particularly peritonitis, may arise and close life sometimes during coma; it is worthy of note that such low inflammations are prone to give but few signs of their presence, tenderness being absent or some other prominent symptom being in abeyance.

In severe essential diabetes, sometimes hereditary, the early indications are not generally well marked, some feeling of malaise or a sense of feverishness being the first sign. Soon the frequent passage of a clear watery urine, having the faint odour of sweet apples, attracts the attention, the stools become dry, hard and infrequent, thirst troublesome, and the skin dry and harsh. Loss of sexual power and of the knee-jerk with severe pains thought to be rheumatic, probably announce the arrival of a diabetic multiple neuritis; the pains are often felt in the loins, and the palms and

soles have a burning feeling to the patient. Excessive eating (bulimia or polyphagia) disturbs the digestion, and the patient thinks of worms. He may become mentally depressed, not unnaturally hypochondriacal, and at times suspicious. If the disease lasts long a tubercular pneumonia is apt to supervene without much fever. Should fever appear, the glycosuria diminishes or may be lost. Soft cataract, diabetic, almost indistinguishable from albuminuric, retinitis, boils, eczema and other skin lesions are possible manifestations.

Glycosuria is only a prominent symptom of the sugar in the blood, and this is doubtless obtained by a too free conversion of the glycogen of the liver and perhaps other tissues; probably a ferment which exists in arterial blood is the cause of the conversion; an excess of arterial blood is supplied to the liver from dilatation of the hepatic artery due to disease or disorder of the vasomotor centre of the liver in the floor of the fourth ventricle. At least this chain of events is highly probable, but the physiology and pathology is a complicated matter. Pavy shows that the starch of food does not become glucose in the pancreatic digestion, but only maltose, which has but half the reducing power on cupric oxide of glucose; the liver, or something in the liver, converts this maltose into glycogen, or if diabetes exists the maltose is turned into glucose instead of glycogen; this matter is simply one of hydration or dehydration, and is carried out by a hydrolytic ferment like diastase.

Patients often die rather unexpectedly in coma or in collapse, or less often in delirium. The symptoms are doubtless due to toxæmia, but the nature of the poison is not settled; perhaps it is not acetone.

The urine is of high specific gravity, sometimes as much as 1060; it may give a red-brown colour

with a weak solution of ferric perchloride due to acetone; uric acid crystals and oxalate of lime octahedra are not uncommon; the urea discharged *per diem* is excessive as a rule. The tongue in severe cases becomes intensely hyperæmic, participating in the hyperæmia of the liver, pharynx, œsophagus, stomach and kidneys; it then looks something like raw beef.

The temperature of the body is not raised unless there be some inflammatory accident. In the comatose state the expired air is cold, cyanosis may be marked, the metabolism appears to be almost suspended. A severe shooting pain at the epigastrium, reminding one of the constricting pain of angina and spinal disease, may give warning of the approach of coma.

Warm clothing, exercise short of fatigue, plenty of fresh air and bathing, with avoidance of excitement or hard work, a diet, free as possible from sugar and starch, are essentials in the treatment of diabetes. The diet should be changed gradually: oil, cream, butter, green vegetables, meat, fish, poultry, game, eggs, tea, coffee, almond biscuits, bran cakes, gluten bread may be taken; potatoes, rice, bread, sago, tapioca, beetroot, carrots, turnips, livers, oysters, jams, pastry, cakes should be avoided. Broths, soups and jellies prepared without meal or sugar, but flavoured to taste, may be allowed.

Milk is physiologically, owing to its sugar, not permissible, but is often given and with advantage to diabetics. Spirits, wines and beers are allowed by some, it is best to avoid all sweet wines and malt liquors. Glycerine and saccharin for sugar. Thirst is sometimes relieved more by hot weak tea than by ice, soda water, or diluted phosphoric acid, or bitartrate of potash; weak beef-tea or mutton broth should be remembered. Enemata of warm olive oil or glycerine, or warm soap and

water are the best means of relieving the bowels, or internally a little saline aperient.

Opium, as a powder or pill, gradually increased, commencing with half a grain dose twice a day, is the best remedy, codeia in third of a grain doses also increased; and antifebrin in grain doses three times a day.

SCURVY.

It is within our power to produce scurvy at will by depriving any individual of a proper supply of fresh food, and the ease with which scurvy is produced may be increased by placing the individual in the midst of insanitary surroundings, impure air and overcrowding being especially potent, though quite incapable of themselves to cause true scurvy. Sir Alfred Garrod believed that a deficiency of potash salts, especially those contained in vegetables, was the real cause of scurvy.

Broadly speaking, scurvy is characterised by a great alteration in the state of the blood, which becomes deficient in hæmoglobin and red corpuscles, and as in all cases of mixed toxæmia and anæmia, degenerative changes, chiefly of fatty sort, are prone to occur in the tissues and vessels, thereby increasing the liability to hæmorrhages and to destruction of those tissues most exposed to irritation, such as the gums. Side by side with the anæmia, the nervous system loses strength, the whole body suffers, the health declines, and the circulation is prone to fail in severe cases from syncope, which may with reason be largely attributed to fatty degeneration of the muscle of the heart.

The gums become spongy, swollen, and inclined to bleed, especially when the teeth have not been kept free from tartar. In infantile scurvy the

gums scarcely suffer at all if the teeth have not been cut, which is not infrequently the case, since rickets generally accompanies scurvy, and delays their eruption.

In the legs petechiæ appear to be aided in their production by the force of gravitation, and these limbs are generally the first seats of hæmorrhages. Considerable extravasations in the inter-muscular planes of connective tissue, in the periosteum of the long bones, especially in infants, and even into the muscles, occasion much pain, tenderness, induration, and also contraction with stiffening of the joints. The nose and mouth may bleed profusely, and blood may be expectorated from the lungs, vomited from the stomach, or passed by the bowel. As the deterioration of the blood and tissues proceeds, actual sloughing of the gums may lead to exposure and necrosis of the jaw with preliminary shedding of the teeth. A peculiarly sallow and dusky tint of the skin, very fœtid breath, with much shortness of breath, are natural consequences of the fore-mentioned processes. Purpura and scurvy, unless complicated, manifest themselves by hæmorrhages and want of fever, they may be mistaken for one another, but the spongy state of the gums, the dusky hue of the skin, and the history of abstinence from fresh meat and vegetables are peculiar to scurvy. A comparison of the symptoms of scurvy with those of idiopathic and pernicious anæmia, seems to prove that mere chronic want of oxyhæmoglobin though it does give rise to fatty degeneration and hæmorrhages, cannot make the spongy gums of scurvy.

Too obvious to need detailed description, the treatment resolves itself into supplying the patient with antiscorbutics, and keeping him in a warm and pure atmosphere. Fresh lemon and orange juice, fresh milk diluted with barley water, a

purée of well boiled mashed potatoes, are valuable. Opium is of great service in severe cases to give sleep and relieve pain. The recumbent posture must be observed in all severe cases for fear of fatal syncope. Frequent syringings of the mouth with antiseptic lotions should be practised.

RICKETS.

The consequence of bad feeding of a feeble infant, rachitis, though spoiling all the tissues of the body, often makes its presence most felt in the bones. The sleeping child often has a copiously sweating forehead, and may kick off its bedclothes. When awake it has by no means such tender nerves and muscles as has been stated.

Besides these symptoms the nervous system may present convulsions, laryngismus stridulus and tetany; the digestive system, diarrhœa of slimy offensive sort, much flatulence, and a large tympanitic soft belly; and the lungs, bronchitis and its consequences. The muscles everywhere are weakened, and it is this debility chiefly which prevents the child from joining in the pleasures and games of its age. The diarrhœa increases the weakness, and in the words of the mother, "takes the child off its legs," and causes the spine "to grow out" into an unnatural convexity backwards somewhat resembling the "cat's back."

Some beading of the fifth and sixth ribs at their junction with the cartilages, and some swelling of the wrists at the junctions of the shafts with the epiphysis of the radius in the majority of cases are the first signs of the bones being involved, if we except the general failure of the child to increase in stature at the proper rate, which must be attributed largely to the changes at the growing ends of the bones. The failure to increase in

weight is due to many causes combined, but the deficiency in lime salts of the bony parts is a not inconsiderable cause.

The beading, always most marked on the visceral aspect, may affect all the ribs, an appearance as of a rosary beneath the skin being seen; the postero-inferior regions of the parietal bone and the occipital bone may be much thinned (craniotabes) as the result of deficient ossification, and from their being compressed between the pressure of the brain and of the pillow—on which the child's head may be rubbed to the loss of its hair. The jaw and face may fail to develop properly, the cranium is apt to become large and misshapen, the high square forehead, sometimes projecting beyond the orbits, whilst the anterior fontanelle often is much larger than natural, and may not close till long after its usual period—(average 18 months). The femora may curve with the convexity forwards and outwards; the tibiæ often get remarkably convex forwards, and may be bent almost at an acute angle a little above the ankle. The knee-jerks and plantar reflexes are almost always exaggerated. The rickety thorax is not a true pigeon breast because a bilateral grooving exists in front of the angles of the ribs, and behind the beaded junctions of ribs and cartilage, so that the transverse section of the thorax instead of being triangular has a "cottage loaf" shape.

A section through the head of a rickety long bone shows that the layer of blueish translucent proliferating cartilage is much more abundant, and more irregularly shaped than in normal ossification, whilst beneath the periosteum newly formed layers of tissue are found composed of stellate cells with homogeneous intercellular substance. A network of these cells and contiguous intercellular material may become calcified, or

mere calcified islets may exist. Instead of becoming ossified the red granulation tissue in the medulla of the growing end of the bone gives rise to a spongoid tissue, the cells of the granulation tissue becoming angular, and the intercellular substance irregularly fibrous.

In many cases of rickets under the age of sixteen months, the child will be found to be eating too much starchy food.* Cod-liver oil, steel wine, fresh air, fresh milk, with woollen clothing, are the best recommendations in treatment.

MALIGNANT GROWTHS.

MALIGNANT growths may be more fully studied in works devoted to pathology.

A new growth being principally composed of cellular elements, intercellular material and blood vessels has a general resemblance to other tissues of the body from which it must ultimately be derived. Many believe that the cells of the malignant growth are direct descendants from the cells of the tissue in which the new growth occurs, but others have regarded the leucocytes of the blood to be the material elements, out of which the sarcoma or carcinoma has to be built up, just as in the case of an inflammatory neoplasia. Any way, the tissues of the part in which the cancer exists, undoubtedly impress their characters on the foreign substance, so that a sarcoma occurring in bone often ossifies, and a cancer in the breast copies the general structure of a mammary gland.

In their tendency to spread beyond the bounds of the tissue in which they originate, in their proneness to be propagated along lymphatic channels, to cause glandular enlargements, to

* See the Author's *Treatment of Disease in Children.*

sprout in parts distant from the first tumour, as well as their great propensity to come again after extirpation, these morbid processes differ markedly from simple inflammation and simple tumours. They remind us of infective processes, like pyæmia and septicæmia, and the old authors justly named them malignant to distinguish them from more benign growths. Characterised by being composed of epithelial-like cells grouped into alveoli by fibrous partitions in which the blood vessels run, true carcinoma differs from the general run of true sarcomata in which each cell is separated from its neighbour by an intercellular substance and thin-walled capillaries.

Cornil and Ranvier have also maintained, that the alveolus of a cancer is practically a lymphatic space in direct communication with the lymphatic vessels, and if true this arrangement would readily explain the great tendency of carcinoma to involve lymphatic glands.

A scirrhus differs from an encephaloid cancer chiefly in its containing less cancer juice, more fibrous tissue, and being less rapid in its growth, thus conforming to a general law recognising pliability, softness and wateriness as inevitable companions of a malignant tendency.

Hereditary in many cases, cancer seldom tends to break out till after middle life, and though most common in females owing to the frequency of cancer of the breast and uterus, males do suffer largely from it, and in them it has a predilection for the skin and digestive organs.

In children pure cancer is very rare, but to balance this, sarcoma of the bones, kidneys and testicles is of common occurrence. The frequency of sarcoma in infancy does lend some colouring of truth to the theory advanced by Cohnheim, that neoplasia are produced by growth and multiplication of some remnant of blastema or

undifferentiated embryonic tissue not required in the construction of the organism. That all the varieties of sarcomata have their prototype in embryonic tissues is an additional argument in favour of this conjectured mode of origin.

After causing much pain of shooting character, and after growing all the time and feeding on the juices and tissues of the body, malignant growths reduce the flesh and strength, and waste the blood of the sufferer, who thus falls into a cachexia with sallow skin, anxious expression and pinched features.

CONSTITUTIONAL SYPHILIS.

After the local introduction of the specific syphilitic poison, some ten to fifty days elapse before the true Hunterian chancre first appears, but at the same time indurated buboes or glands may be detected in the groins. In a few weeks the blood becomes tainted by the peculiar virus, and this interfering with the nutrition of the blood capillaries and tissues produces a series of morbid phenomena divided by syphilographers into secondary and tertiary, the term primary being retained for the manifestations due to local inoculation. Leaving no tissue untouched, syphilis is well known also for the variety of its manifestations and for its propensity to attack parts of the body often respected by other forms of skin disease and blood poisoning. A proneness to leave behind much dusky copper coloured staining of the skin, whilst its inflammatory eruptions scarcely cause itching, are features of diagnostic interest.

Sir William Jenner used to teach that scabies and syphilis should first and only be thought of where the palms of the hands and the soles of the

feet were the seat of an eruption. Syphilis has a selective action also for the forehead. Alopecia, mucous patches of the mouth, tonsils and larynx, condylomata of the arms, iritis, choroidal changes, nodes on the shins, are well known manifestations. Shakespeare describes syphilis when he makes Timon of Athens say to the two prostitutes "consumptions sow in hollow bones of man; strike their sharp shins and mar men's spurring. Crack the lawyer's voice that he may never more false title plead, nor sound his quillets shrilly; hoar the flamen that scolds against the quality of flesh; down with the nose, down with it flat; take the bridge quite away of him that smells from the general weal; make curl'd pate ruffians bald and let the unscarred braggarts of the war derive some pain from you; plague all; that your activity may defeat and quell the source of all erection,"—as it does when syphilis long latent is followed by *tabes dorsalis*.

During the tertiary stage the viscera and deep tissues suffer, and often severely. Symmetrical lesions are most common in the secondaries, whilst gummata (syphilitic tumours) occur irregularly. Syphilis in a healthy constitution touches the tissues lightly, at first mere erythemata being its manifestations on skin and mucous surface, but as it undermines the general health more severe lesions at first inflammatory, later on ulcers and tumours, arise, the syphilitic virus getting the upper hand of the vitality of the body commits fearful havoc. When the secondaries have been marked the liability to tertiaries and to sequelæ is said by a general consensus of opinion to be lessened. The treatment of syphilis in medical practice does not differ from that practised by surgeons.

SCROFULOSIS—TUBERCULOSIS.

The tubercle bacillus finding a favourable soil produces tuberculosis in scrofulous subjects. A scrofulous or strumous habit is said to exist when certain chronic inflammatory and suppurative lesions of the skin, mucous membranes, bones, joints and lymphatic glands, are prone to develop. Now these inflammations may in the light of recent researches be ascribed to the tubercle bacillus as the exciting cause—just as in anthrax the bacillus is the chief cause—but in order that the bacillus of tubercle shall take root and grow the tissues of the part in which it is sown must prove a favourable soil. From a local scrofulous or tuberculous lesion the bacilli may be spread either along the lymphatic spaces and vessels, or finding their way into the blood stream they may infect tissues at a great distance from their original source. If any argument were needed to prove that strumous and scrofulous lesions were something more than mere simple chronic inflammations, it seems to me it would be found in the fact that despite every local care, rest and attention, the morbid process proceeds in its accustomed fashion, now exhibiting a tendency to further infiltration, and then showing signs of retrogression and diminution in activity, only later perhaps to be followed by a similar reawakening and subsidence. Many reasons might be given pointing to the belief that the tubercular virus, perhaps in an attenuated form, was the essential cause of these morbid processes. "As regards hereditary influence, it may be noticed that if by this is meant that there is a certain poison or strumous virus transmitted from parents to children, the position is hardly tenable; but, on the other hand, if it be only understood that the children of tuberculous

parents are more liable to have the disease developed in them on the application of the exciting causes than the children of healthy parents, as was the opinion of John Hunter, the position is most probably true." The same proclivity to become tuberculous may be brought about by syphilis, bad air, bad food and especially residence on a damp soil. In fact anything which deteriorates the vitality and produces diseased nutrition doubtless induces a like liability. "It is a matter of common observation that tuberculous patients are often very sanguine in expecting recovery; though, unfortunately, they generally imagine a cure is to be effected without any great exertion on their own part. It seems to me that in no disease is it more important to impress upon the sufferer the absolute necessity for steady perseverance in the use of remedies, and the hopelessness of giving way to that want of energy and determination, with many excused by the expression of their devout desire to 'trust in Providence,'" Tanner, 1861. From all this it follows that avoidance of all causes of diseased nutrition, good feeding especially with milk, abundance of pure air and healthy exercise, with residence in a dry and healthy climate, are the main principles of treatment. Cod-liver oil, malt, syrup of the hypophosphites, ferruginous and nervine tonics, are powerful adjuvants.

It is unnecessary here to insist on the value of surgery in the cure of local scrofulous lesions. A knowledge of the structure of tubercle and a fuller exposition of the pathology of tuberculosis should be sought in special works and in surgical treatises.

Section IV.

DISEASES OF THE MOUTH.

THRUSH.

Whenever the secretion of the mouth becomes acid, or the mucous lining of the mouth gets debilitated or altered, a fungus, the *oidium albicans* or *mycoderma vini*, finds a favourable soil for taking root and growing. In the form of whitish milky looking patches easily removed from the red but not ulcerated surface, this thrush is very common in infants fed with sour milk from objectionable bottles. It may be seen also in severe marasmus, however caused, and thus it is often a sign of the approach of death in such exhausting diseases as phthisis, typhoid fever and pyæmia. But in hand-fed infants, or even sometimes in the breast-fed, its prognostic indications need be not at all unfavourable. Frequent syringing of the mouth with an alkaline solution of carbonate of soda, five grains to the ounce; removal of the patches by soaking them in glycerine of borax, and then pencilling with a soft camel's hair brush, just as sordes on the lips and mouth should be treated, is the chief local treatment of a purely local condition.

STOMATITIS.

A red, hot, swollen and tender mouth is common in infants especially during dentition, and in acute specific fevers, and in catarrh of the alimentary tract from any cause.

All diseases of the mouth are attended with

salivation, fœtor of breath, difficulty in deglutition, mastication and articulation.

If vesicles form the stomatitis is called aphthous; if yellowish spots or patches of diphtheroid appearance, ulcerative. When these conditions result the stomatitis is often epidemic, and by some regarded as identical with the foot and mouth disease of cattle, and derived therefore from cow's milk.

The vesicles or ulcers may be found on the gums, which are apt to be spongy and readily bleed, on the palate, lips, cheek and tongue; they appear to spread by contact. The ulcerative stomatitis is more common after the teeth have appeared, and thus contrasts with the simpler forms which more generally complicate the process of dentition. The degree of fever and digestive derangement varies in these forms of stomatitis.

Syringing the mouth with ice-cold water or boracic acid lotion or chlorate of potash lotion is very useful. The chlorate of soda or potash may be given internally in three grain doses four times a day in the ulcerative variety. Fluid diet, fresh air, a mild purgative, some alkaline bicarbonate, complete the treatment. Obstinate ulcers may be healed by the application of the solid nitrate of silver.

CANCRUM ORIS.

Gangrenous stomatitis occurs in children of debilitated habits between the ages of two years and five. When first seen the child is obviously ill and pale, and on one cheek a hard indolent swelling may be felt. On looking into the buccal pouch a whitish or ash-coloured slough is seen in its centre, whilst the corresponding cutaneous surface

may be simply red and glazed or scarcely at all abnormal. A copious flow of saliva and a horrid stench may also strike the attention. In bad cases the gangrene may increase in extent and depth till the cheek is so destroyed that a wide opening is formed, and through this the bare jaw with loosened teeth may be observed.

The debilitated state of these children appears to be frequently the sequel of measles, whooping-cough and typhoid fever. In many respects the disease resembles the gangrenous ulceration of the back and sides of the scalp occasionally associated with chronic tuberculosis in marasmic infants.

Frequently syringing the mouth with solutions of chlorinated soda or sanitas, freely powdering the sloughing parts with iodoform, endeavouring to limit the sloughing by the application of strong nitric acid and the free administration of strong beef-tea, raw meat juice, peptonised milk and Mellin's food, are the main principles of treatment.

INFLAMMATION OF THE TONGUE.

Morbid states of the tongue, like liver disease and disease of the lymphatics, is often secondary to some other morbid condition. Injury, stings and mercurialism are the chief local causes. The tongue becomes painful, and there may be referred pains in the neck, its colour is deep red, and its size is greatly increased and it may be too large to remain in the cavity of the mouth. When the enlargement is so great the upper opening of the air passage tends to become occluded by the swelling and paralysis, thus giving rise to dyspnœa.

Mastication, articulation and deglutition are interfered with, and salivation results. In severe cases the tongue must be slit into longitudinal

furrows on the dorsal aspect. Tracheotomy has had to be performed for mercurial glossitis. The mouth may be syringed with ice-cold water and with some astringent wash. A free purge with jalap or scammony affords some relief. Abscesses should be opened. The tongue may be furrowed in many directions recalling the cerebral convolutions, and to this condition ulceration may be added when the term glossitis dissecans is employed.

ULCERATION OF THE TONGUE.

Ulcers of the tongue are very painful and very difficult to heal. *Simple* or irritative ulcers are superficial, situated at the tip or frænum, but if due to carious teeth they may be at the sides of the organ. The teeth require attention; the food should be chiefly farinaceous and vegetable with but little meat, the bowels must act every day, and the ulcers may be touched all over with nitrate of silver or sulphate of copper.

Herpes, small-pox, syphilis, scurvy and cancer may cause ulceration of the tongue as well as of the mouth.

PAROTID BUBO.

Besides the specific parotitis which never suppurates the parotid gland may undergo another variety of inflammation, and this may end in suppuration. It often has rather curious associations, being apt to be secondary to abscesses and ulcerations situated in the abdomen. In typhoid fever and after ovariotomy this form of parotitis is not so very rare. With many morbid states of the blood it is, too, very likely to arise. Though the inflammation is liable to go on to suppuration, and generally complicates severe diseases, yet the

prognosis is perhaps not so bad as has been made out. There is no difference in the treatment of inflammation and suppuration of the parotid gland than in the treatment of the same morbid processes in other superficial parts.

INFLAMMATION OF THE TONSILS.

Common quinsy, though generally attributed to mere "taking cold," is very likely sometimes the effect of a special poison, since in certain cases it runs through families and does seem to be contagious. Ushered in by a considerable feeling of illness quinsy manifests itself by smart fever, vivid redness and swelling of the tonsils, difficulty of swallowing and sometimes severe pain shooting apparently along the Eustachian tube to the ear. The inflammation may resolve naturally, but in certain individuals nearly always suppurates. When the abscess bursts or is opened artificially the suffering suddenly ends and a vigorous appetite usually makes its appearance. Quinsy is one of those diseases, the liability to recurrence of which is increased by repetitions of the attack, especially during the youthful periods of life.

Sometimes, especially in hospitals, follicular whitish secretion forms in few or many isolated spots on the tonsils, and diphtheria seems to be threatening. It is best not to call cases diphtheria unless a continuous layer of membrane forms, but some practitioners speak of a membranous tonsillitis in which the disease manifests itself suddenly with sharp fever. It must be confessed, however, that though diphtheria usually commences gradually, though its membrane has a tendency to spread beyond the tonsils on to the soft palate and other parts, and to relapse after natural or artificial removal, and though albuminuria is common,

yet cases having the clinical characteristics of membranous tonsillitis have been followed by croup, by much debility and even paralysis, just as is supposed to happen only from diphtheria.

The treatment resolves itself into purging the patient with a couple of drachms of effervescing sulphate of soda, applying cold water or ice compresses to the throat and relieving the discomfort due to the collection of mucus by ordering ice to suck and administering iced milk, raspberry vinegar and water, and other light fluids. A few doses of tincture of perchloride of iron in syrup of orange beneficially influences the course of and the convalescence from this affection. If the circulation is greatly excited, the skin being hot and dry, the patient robust and the temperature high, tincture of aconite in minim doses every half hour often greatly relieves the inflammation, the tonsil from being hard, tense, dry and bright red becomes moistened and softened with a corresponding relief of the morbid sensations in the throat.

Acute attacks may leave behind much enlargement of the tonsils which may interfere with the breathing, cause snoring during sleep, give a nasal voice, and lead to a transversely constricted thorax.

RETRO-PHARYNGEAL ABSCESS.

RETRO-PHARYNGEAL abscess may occur from other causes than caries of the spine, being met with in young infants as an idiopathic affection. To attribute these infantile cases to acute specific fevers is perhaps not warranted, seeing the rarity of the latter during the first months of life. The abscess may be seen projecting into the pharynx, but sometimes it is lower down, being situated behind the œsophagus. By its pressure on the gullet and larynx it obstructs deglutition and respiration, and

these symptoms are generally worse when the infant or patient is in the recumbent posture. The abscess must be opened.

DISEASES OF THE GULLET.

Diseases of the gullet are rather rare and need not occupy us long. The chief affection is malignant stricture, usually epithelioma of the upper third of the tube. It tends to spread around the gullet, to infect the glands in the neck and to ulcerate into the trachea, so that dysphagia of gradual onset, large glands about the level of the obstruction, with starvation, emaciation, anæmia and loss of strength are the symptoms. The difficulty in swallowing is noticed first with solids, liquids being passed without difficulty.

Above the stricture dilatation of the tube and hypertrophy of the muscular coats take place, whilst below the gullet gets contracted and wasted. Dyspnœa may develop and be due to implication of the recurrent laryngeal nerves by the new growth, thus causing paralysis of the abductors of the glottis, a loud piping or hissing inspiration resulting, or a polypoid projection may project into the trachea and cause similar stertor as has been seen at University College Hospital, though when this tracheal obstruction occurs the stertor should be both inspiratory and expiratory.

Regurgitation of food necessarily follows when the obstruction is marked and the gullet dilated, and much mucus sometimes with blood or pus may be ejected. The fluid rejected being usually alkaline and unattended with nausea, though sometimes with much retching, it is not difficult to distinguish the regurgitation from actual gastric vomiting. Pain may be referred to the manu-

brium sterni. Scirrhus and scirrho-encephaloid cancer may occur also and at lower parts of the gullet generally. Occasionally this canal becomes the seat of organic fibrous stricture induced by inflammation, the result of caustics, some strong acid having been inadvertently swallowed.

Simple spasmodic contraction is a temporary cause of stricture in hysterical subjects; and more serious causes of stricture are pressure from gôitre and enlarged glands in the neck, aneurysmal or other tumours in the mediastinum. Paralysis of the œsophagus occurs in some degenerative diseases of the central nervous system.

Simple dilatation of the whole circumference or a simple pouching of one part are other morbid conditions sometimes of congenital origin. The gullet may be perforated from within by simple or malignant ulceration, or from without by aneurysms and other tumours.

Dysphagia may arise from tonsillitis and diphtheria; from erysipelatous or other inflammation of the connective tissues of the neck, or from retro-pharyngeal abscess; from paralysis of the muscles of deglutition; from malignant, syphilitic and tubercular ulcerations about the larynx. These being remembered the diagnosis is not often difficult, and a bougie is of service in diagnosing organic strictures from simple ones.

Auscultation of the gullet may aid in the diagnosis; the patient swallows some liquid, and the physician listens to the sounds thus produced by placing his stethoscope on the back of the neck and down along the left side of the spine in the direction of the gullet; liquids produce but little sound in passing through a healthy gullet.

In simple fibroid stricture the bougie is needed in treatment just as for stricture of the urethra. Careful feeding, sometimes by the rectum, or even by an artificial gastric fistula, is the chief treatment

of both fibroid and malignant stricture. The bougie used in diagnosis has been passed in malignant cases through a hole in the œsophagus into the trachea, so that much caution is needed in the use of this instrument. Occasionally fibroid strictures are recovered from, my experience affords one example in a boy who swallowed liq. potassæ at the age of four, he is now ten and seldom shows any sign of stricture; gradual dilatation by bougies was practised, at first with, later without, chloroform anæsthesia.

Section V.

DISEASES OF THE CHEST.

INFLUENZA.

Influenza is the type of an epidemic disease, the specific poison causing many individuals simultaneously to become affected with catarrh of the respiratory and alimentary tracts; it is probably also contagious. Since severe mental and nervous prostration is a marked symptom lowering treatment must never be adopted. The incubation period is usually only a few days; the invasion is abrupt with chills or rigors, and the fever is fairly high, 103°-105°, with corresponding symptoms —headache, pains in the limbs, sense of misery and thirst. Sneezing, soreness of the eyes, sore throat, hoarseness and cough, just as with catarrh, are the local symptoms. There is danger from nerve prostration and from the extension of the catarrh to the minute bronchioles and pulmonary alveoli (capillary bronchitis and broncho-pneumonia) especially in the infant and the aged.

The treatment resolves itself into rest in bed, with highly nutritious fluid diet, stimulants, inhalations of medicated steam, gargles of raspberry vinegar and water, fomentations or poultices to the chest, and tonics during convalescence.

CATARRH.

A CATARRH is an inflammation of the mucous membrane of any part of the body, but most often of the lining membrane of the nose (coryza), of the frontal sinuses (gravedo), of the pharynx or bronchial tubes. It is a disease resulting from any *sudden* change of temperature of the whole surface or of a limited surface of the body, but only when the vitality is below the standard, or when the nervous centres regulating the circulation of the mucous membrane of the air passages, are in a certain state of atony, often the consequence of habit. This theory accounts for the tendency of catarrhs to become chronic, *e.g.*, naso-pharyngeal catarrh, so common an affection of populous cities. When the heated body is exhausted of nervous energy from any cause, then is the time that a sudden application of cold, as from sitting in a draught, is most prone to develop catarrh and other inflammatory diseases. A feeling of malaise with cold and hot sensations about the body, a rise in temperature, sneezing, sore throat, hoarseness, first glairy mucus and later on muco-purulent discharge, with soreness of the nose, are well known symptoms, and the symptoms of slight or moderate fever are met with in the anorexia, thirst, constipation, furring of tongue, heat, and later sweating of the skin.

Catarrh is attended by hyperæmia of the mucous membrane, and this excess of blood if long continued, as in chronic catarrh, often leads to an increase in the connective tissues of the part just

as happens elsewhere; if it continues, constriction of the arteries occurs, and the mucous membrane grows pale, and large veins, due to the same constriction, may be seen in the pharynx. Before this atrophic fibroid stage is reached, a period of hypersecretion may exist for a long period, necessitating constant hawking, especially in the morning to clear the pharynx. Chronic rhinitis and pharyngitis constitute sources of danger to the hearing and occasionally even to life, for otitis is apt to develop repeatedly, the membrana tympani may be ulcerated, otorrhœa and polypoid granulations follow, bone disease sets in with its pathological possibilities of thrombosis of the cerebral sinuses or abscess of the cerebellum or brain. Chronic pharyngeal catarrh is often associated and said by some to be due to adenoid overgrowths.

OZÆNA.

Chronic inflammation of the Schneiderian mucous membrane may result from a simple or repeated catarrh, from struma, syphilis and gout; in all cases the digestion is apt to be deranged. Snuffling or stuffiness in the nose with impediment to the nasal respiration, headache, mental depression, cough, attacks of sneezing, general debility, profuse fœtid discharge of muco-pus, dried scabs or even blood may be the symptoms, and in bad cases the chronic inflammatory exudation may lead to sloughing of bone and soft tissue with perforation of the septum and destruction of the ethmoid bone; the bridge of the nose may sink in; these results are more common in syphilis than from struma or simple chronic ozæna. The whole of the discharge and scabs must be systematically removed at least twice a day by means of syringing with warm water

coloured with Condy's fluid or made antiseptic with chloride of zinc, a grain and a half to the ounce; then the membrane should be medicated with iodoform or weak nitrate of mercury ointment or with powdered iodoform introduced by an insufflator. Later on the compound alkaline lotion of seven grains each of sodic chloride, bicarbonate and biborate, with a little sugar, in half a tumblerful of warm water, may be sniffed up the nostrils and allowed to flow into the naso-pharynx. The digestion must be regulated; tonics, especially ferruginous, and malt and cod-liver oil are useful; in struma syrup of iodide of iron; in syphilis mercury and iodides. A change to the seaside on a bracing part of the coast is most beneficial, but the local treatment (antiseptic and astringent) is fully as important.

DISEASES OF THE LARYNX.

Pain, tenderness, cough, alteration or loss of voice, dyspnœa with stridulous inspiration and expiration and often occurring in spasmodic attacks, a frequent brassy or metallic paroxysmal cough, expectoration, and difficulty in swallowing, are symptoms common to all organic affections of the larynx. These symptoms, easily understood on physiological grounds, should be committed to memory, and then there will be no need to repeat them in describing the diseases of the larynx. Further, œdema of the glottis is prone to arise in many of the organic diseases.

Acute laryngitis may be a slight affection when it accompanies catarrh of the respiratory passages, or it may be severe when arising from "cold." Swallowing hot water, or acrid liquids, and overstraining of the voice are common causes, and any morbid condition of the larynx—tubercle, syphilis,

new growths, or the pocks of small-pox, may originate it; further, it often complicates measles, and other acute specific fevers. Like bronchitis, tonsillitis and rheumatism, one attack paves the way for another.

The symptoms have already been enumerated, and acute œdema is common in the varieties due to swallowing irritating liquids, and in the acute laryngitis which accompanies tangible disease of the larynx.

The parts of the larynx which swell are those in which the submucous tissue is loose, and these are, speaking roughly, the parts bounding the upper opening.

True croup cannot always be separated from acute laryngitis in young infants, but false croup or laryngismus stridulus is unattended by fever, and signs of rickets or tetany or convulsions may be evident. Still all three affections are apt to set in at night, and care is therefore required in the diagnosis.

TRUE CROUP.

True croup may be defined as diphtheria of the larynx and trachea. It is generally complicated by bronchitis and its consequences, emphysema and broncho pneumonia, and is most common in infants under the age of two years. It may, just as diphtheria, end fatally from exhaustion, suffocation or the formation of a clot in the heart. Indeed the throat often presents, in addition to the signs of inflammation, a speck or patch of whitish material. The first symptoms are often not serious, being merely those of an ordinary catarrh or some unnatural sleepiness or mere fretfulness. If coughing is present this excites no particular notice till it becomes "croupy" or "brassy,"

having a metallic, often clanging, sound; then also the cry and voice may be noted to be hoarse, aphonic or simply metallic, and the breathing excites alarm by its long-drawn inspirations making a piping or hissing noise.

The pathology of true croup consists in inflammation attended with a fibrinous exudation, which may simply form a layer on the surface, or may also be firmly fastened by deep roots to the submucous tissue. Some assert that the membrane is derived from the epithelium by simple metamorphosis, whilst most assert that it is a coagulated exudation from the blood. "The layer may be thin or some lines in thickness; so diffluent that it may be wiped off or so consistent that it can only be removed as a cylindrical cast of the tube; either firmly or loosely adherent and limited to the walls of the larynx, or extending from the glottis down to the minute bronchi."

The mortality from croup is very great, for probably at least half the children attacked die. Death may occur from pure asphyxia, the right heart being unable to force blood through the pulmonic capillaries of the embarrassed lungs; in some instances the formation of a firm clot in the right cavities of the heart produces death, whilst in others asthenia with convulsions and coma may close the scene. Sometimes the death proceeds from syncope, the effect of myocarditis or simple dilatation of the heart.

In favourable cases the disease subsides in the course of a few days, large or small quantities of false membrane being expectorated either in shreds or actual casts of the trachea and tubes.

Insanitary surroundings and exposure to bad weather by lowering the vitality predispose to all forms of laryngitis including croup.

That measles may be attended with or followed by a malignant form of croup should be remem-

bered; occasionally scarlet fever and typhoid fever are thus complicated.

Sloughing of the mucous membrane of the epiglottis is not uncommonly seen at necropsies, and may be suspected from the great fœtor noticed at the bedside.

Tracheotomy* should be performed if there be signs of increasing obstruction to breathing, as shown in the pallor and cyanosis, the weak voice and increasing recession of the chest walls during inspiration. The experience at Great Ormond Street and at University College Hospital is decidedly in favour of resort to early tracheotomy. Intubation is still on its trial.

The treatment consists in placing the child in bed, kept free from draughts by means of a tent; into the tent steam from a bronchitis kettle may be ejected, and the temperature of the tent should be about 70° F.

Half a grain of sulphate of copper dissolved in water, every few minutes, the back of the throat being tickled with a soft feather will generally produce vomiting, and if the case is one of simple laryngitis much relief may be afforded, whilst if the laryngitis be membranous a layer of the membrane may be ejected. A bath with a little mustard—one ounce to two gallons—at a temperature of 100° F. is very good treatment in spasmodic attacks, and the head may be douched with cold water at the same time.

Calomel with compound jalap powder should be prescribed if the bowels have not acted.

An effervescent mixture of carbonate of ammonia with citric or acetic acid and a little syrup may be prescribed every few hours. Alkalies and iron are other remedies. Hot fomentations to the neck and sprays of carbonate of soda, ten grains to the ounce of water, are also useful.

* See the Author's *Treatment of Disease in Children.*

Nourishing diet is required, and stimulants may be necessary.

CHRONIC DISEASES OF THE LARYNX.

Chronic laryngitis may remain after acute attacks, or may accompany syphilitic, tubercular or malignant and simple tumours of the larynx.

Excessive use of the voice as in lecturing or shouting—costermonger's and clergymen's sore throat is a chronic laryngitis (dysphonia clericorum) with special swelling of the mucous follicles, hence often called "follicular." Chronic alcoholism and excessive smoking also cause chronic congestion. Congestion, swelling and mucoid or muco-purulent discharge are the chief anatomical features; sensations of soreness and hoarseness with cough and dysphonia the common symptoms.

Papillomata or warts, fibroid polypi, myxomata and epithelioma are the chief varieties of new growth.

Severe spasmodic attacks are more important symptoms with new growths, and the stridor may be only inspiratory when the tumour is above the glottis, but is generally both inspiratory and expiratory if the tumour involves the vocal cords or the parts below.

With phthisical and syphilitic ulceration, chronic œdema of the epiglottis and aryepiglottic folds is common. Ulceration may complicate typhoid fever. When syphilis is of the tertiary variety ulcerations may lead to necrosis of cartilages, and cicatrisation may ensue, leading to considerable constriction. Cartilaginous necrosis is of frequent occurrence in phthisis of the larynx.

LARYNGISMUS STRIDULUS.

LARYNGISMUS stridulus, child crowing or false croup is a spasmodic disease occurring in infants, generally the subjects of rickets; consisting of temporary closure of the rima glottidis by which the entrance of air into the lungs is impeded or stopped, the symptoms are those of temporary suffocation, the lips get blue, struggling and grasping of the throat being witnessed, whilst when the spasm gives way a shrill whistling or crowing sound occurs and ends the paroxysm; sometimes it returns shortly or in a few hours, or not perhaps for days. Though most frequent at night, many attacks may occur in the day time; tetany, convulsions and facial irritability are other nervous phenomena occurring in the same case, sometimes simultaneously.

The immediate explanation of the phenomena of child crowing must be found in some source of irritation producing reflex spasm, the phenomenon being of the same order as any other reflex action, and further like all morbid reflex actions the nervous centre is abnormally irritable approaching the condition of the epileptic. The trifacial nerve in teething, the pneumogastric in over or improperly fed infants, the spinal and sympathetic nerves in constipation, worms and other intestinal disorders including severe diarrhœa, are the sources of irritation, and these act through the medium of the motor centres of the larynx, in the medulla oblongata and the recurrent laryngeal nerve conveying the impression to the muscles.

In some cases a peripheral irritation cannot be discovered, so that we must imagine that the nervous centres spontaneously explode. Hughlings Jackson suggests that a deficient aeration of the blood may be the reason for some attacks, seeing

that deficiency of oxygen in the blood always leads to a greater action of the respiratory centres.

To relieve the spasm a cold douche to the infant's head, whilst its body is submerged in a bath at a temperature of 100° F., may be employed; or sneezing may be induced by snuff; brown paper smoke, ether, ammonia and nitrite of amyl may be used. Plenty of pure air, bromides and the usual treatment for rickets should be carried out during the intervals.

DYSPHONIA CLERICORUM.

In dysphonia clericorum the pharynx suffers even more than the larynx, though the series of morbid changes are the same in both membranes. These are chiefly congestion and relaxation, enlargement of the tonsils, elongation and swelling of the uvula, with much swelling and sometimes ulceration of the mucous follicles. The nerves seem specially to suffer, much complaint being made of the irritation and incessant desire to hawk and to swallow. On examining the throat and fauces we shall find these parts presenting an unhealthy, slightly raw or granular appearance; the lymphoid plaques or nodules being unduly visible, sometimes filled or dotted with a yellowish substance; and a viscid muco-purulent secretion will be seen adhering to the palate and to the edge of the velum palati.

Everything calculated to improve the general health with nervine tonics should be prescribed, and the pharynx with the upper parts of the larynx may be swabbed with a solution of nitrate of silver, twenty grains to the ounce, twice or three times a week. Before making the application the parts should be thoroughly cleared, by gargling and by swabbing, of the secretions on the throat and fauces. Gargles of tannin, alum, iron and other

astringents may be used every day, and also sprays of terebene and sanitas. Sometimes much improvement follows a reduction in the quantity of food eaten. Early hours, avoidance of late suppers and crowded places of amusement with change of air and of scene and much outdoor exercise are valuable suggestions. Sometimes the digestion is much at fault.

Granulations may be destroyed by the galvano-cautery; this is indeed the best treatment of "granular" pharyngitis.

LARYNGEAL PALSY.

The "cadaveric position" of the vocal cords is a position of slight abduction from the middle line; they move further apart during inspiration; they come nearer together during expiration; while in coughing and phonation they are brought near together and made very tense. If all the muscles of the larynx are completely paralysed, the vocal cords are in the "cadaveric position," there is no voice or cough and no stridor unless on deep inspiration. When both abductors and adductors are paralysed on one side, one cord is in the "cadaveric position," *i.e.*, moderately abducted and motionless, the other moves freely and even beyond the middle line in phonation, the voice is usually altered, coughing is not effective, but there need be no stridor unless on deep inspiration.

When the abductors are paralysed on both sides the cords are near together, and during inspiration not separated but even drawn nearer together; the voice is often not changed; cough is effectual but there is always a stridulous and difficult inspiration. If the abductors are paralysed on one side only there need be no symptoms or only a slight affection of voice or cough, the

cord does not move during inspiration. If all adductors are paralysed the voice is lost, coughing is not so good as usual unless a violent effort is made and there is no stridor or shortness of breath; the cords move normally during respiration, but are not approximated during phonation.

A serious palsy may be suspected if there is inability to effect an explosive cough; if there is no voice the palsy must be bilateral; if the voice is preserved and the cough lost, the palsy is unilateral; loud inspiratory stridor means double abductor palsy; a normal cough and no voice or stridor signifies an unimportant adductor palsy.

Complete palsy of one vocal cord may result from disease of the nucleus of the spinal accessory in the medulla, of its roots at the surface of the medulla, of the trunk of the vagus, and even of the recurrent laryngeal, since the escape of the crico-thyroid does not materially modify the symptoms.

The most frequent cause of abductor palsy is central degeneration; it rarely occurs in severe hysteria, and it may result from disease of the recurrent laryngeal nerve. The abductor muscles are more easily paralysed than the adductor. Hysteria is the common cause of paralysis of the adductors. The treatment of hysterical aphonia is by the faradic or galvanic current, applying the positive pole over the neck, and the negative over the larynx, or between the vocal cords.

HÆMOPTYSIS.

In blood spitting, the blood may come from the lungs or bronchial tubes (true hæmoptysis), or from the pharynx or mouth (false or spurious).

In true hæmoptysis, the blood may come from the pulmonary artery or its capillaries, being due

to active congestion, to mechanical congestion as in heart disease, to blood changes, to rupture of vessels as in tubercular or carcinomatous destruction, to aneurysms as in excavation, or to atheroma of the pulmonary artery; the blood may also come from the bronchial artery or capillaries, or from the aorta or one of its branches when an aneurysm ruptures through the lung, or into a bronchus.

Active hyperæmia is generally present in incipient phthisis, and is a prominent feature in the exacerbations of the disease, if hæmorrhage occurs it is only slight. Aneurysm of the pulmonary arteries is a common source of profuse hæmoptysis whether fatal or not. The tubercular process, the chief cause of profuse hæmoptysis, produces aneurysms by a process called endarteritis and periarteritis being set up in the vessels on the wall of chronic cavities; briefly, this process destroys the middle coat, and converts the wall of the artery at one part into a cicatrix which bulges under the influence of the pressure from within just as in the case of the miliary aneurysms of the brain. The loss of support on that part of the vessel projecting into the cavity, also helps in the formation of the aneurysm. Although these aneurysms may form in acute excavation of the lung, yet clotting of the blood within the vessel with consequent occlusion is most common in acute processes. Syphilitic or tubercular ulceration of the bronchial tubes may frequently lead to slight hæmoptysis, and rarely to a large hæmorrhage from the opening of a bronchial or pulmonary artery.

In bad cases pints of blood may be brought up, and then gurgling sensations may be felt in the bronchial tubes by the patient. When profuse, the blood effused into the bronchial tubes of the patient may cause fatal syncope with suffocation. As a rule, the blood coughed up is bright red, and

rarely, when copious, very dark coloured. If the blood has been retained in the lungs, the clots are apt to become grumous and dark looking, and this darkening of the colour is noticed at the subsidence of ordinary hæmoptysis.

Much shock is noticed in cases of hæmoptysis, partly due to the terror of the patient; generally a reaction soon sets in, and the circulation becomes excited, thus favouring further hæmorrhage; here as elsewhere, a large hæmorrhage tends to lower the temperature of the body.

The blood in hæmoptysis is coughed up, and is aerated or mixed with expectoration, the sputa are discoloured afterwards for some time, the blood is never watery or non-aerated; epistaxis should be inquired for, and the gums and pharynx examined; hæmatemesis may occur with the vomiting due to a cough, but the blood is then generally dark coffee coloured, and the history of the case and the absence of physical signs help the diagnosis.

After hæmoptysis, physical examination should be of the slightest kind, and percussion should not be practised at all. Absolute rest in the recumbent posture, and the avoidance of excitement should be strictly enforced. A grain of opium, two grains of acetate of lead, twenty drops of rectified turpentine given by the bowel, a hypodermic injection of five grains of ergotine, or ten grain doses of gallic acid are common remedies for hæmorrhage, but they do not appear to be very potent in arresting it. Ice may be sucked, and an ice-bag be placed over the supposed source of bleeding, whilst stimulants must be avoided.

Whether phthisis does occur from mere hæmoptysis is still a moot question, though there can be no doubt that in the phthisical, bleeding into the bronchial tubes has set up a destructive bronchopneumonia, and thus increased the extent of the

phthisical changes. Most observers who disbelieve in phthisis *ab hæmoptoë*, claim that the hæmorrhage, though possibly the first sign of phthisis in a given case, was really due to and not a cause of the tubercular disease. It is an astonishing fact that even after marked hæmoptysis, a careful physical examination of the lungs often fails to discover any very definite signs of disease. Hæmorrhagic phthisis is a term which may be roughly used for cases accompanied by marked disposition to hæmorrhages.

Cases of *recurrent hæmoptysis* have been described in which physical examination determined signs of a cavity due to simple changes in the pulmonary apoplexy, a tubercular process not having been present at any time. Fainting may cause arrest of hæmorrhage, and occasionally the bleeding may cease from the clot in the cavity causing effective compression of the bleeding vessel. As a general rule, any true hæmoptysis should be regarded as of serious significance, requiring careful treatment.

Bleeding from the nose and pharynx, hysterical or feigned hæmoptysis, ulceration of the gums, scurvy, simple anæmia and hæmophily should be borne in mind in investigating any case in which blood has been ejected from the mouth. In simple anæmia, blood rarely transudes through the pharyngeal vessels, or there may be genuine rupture of vessels from the morbid state of the blood, perhaps combined with fatty changes in the vessels, it being remembered that in severe anæmia, hæmorrhage and fatty degeneration are prone to arise.

DYSPNŒA—SHORTNESS OF BREATH.

We must distinguish—the sense or sensation of want of breath felt by the patient and due to altered action either of the respiratory centres of the medulla oblongata, or of its cortical representative in the cerebral hemisphere, from actual dyspnœa ascertainable by objective examination, showing itself either in increased frequency of breathing or in augmented action of the respiratory muscles, making the muscular acts of respiration deeper and more laboured. Any abnormal state of the blood or circulation in the respiratory centres, any morbid impression sent along afferent nerves, especially the vagus, will disturb the respiratory rhythm; any emotional or other central change may disturb it also, therefore almost every disease is attended with respiratory disturbances.

DISEASES OF THE BRONCHI—ACUTE BRONCHITIS.

The exciting causes are taking cold in any way, and direct irritation by hot or cold air, noxious vapours and mechanical particles such as cotton, dust, steel, blood, or acrid secretions, tubercles and new growths.

Any form of toxæmia may cause bronchitis, and this is doubtless the mechanism of the catarrh of influenza, measles, pertussis, typhoid fever, rheumatism, gout, syphilis and iodism.

The predisposing causes are infancy and senility, bad climate, faulty modes of living, irrational clothing and general debility. As special predisposing causes must be reckoned, anything which weakens the bronchial mucous membrane,

e.g., rickets, gout, previous attacks, congestion from heart disease.

Redness, punctiform and striated with swelling, opacity and diminished consistence are the chief anatomical changes. As elsewhere, the dry stage is followed by a wet one, in which much secretion is poured out, first thin and watery, but getting more opaque and viscid until it becomes purulent. Excoriations and ulcerations may supervene. There are no mucous glands (cartilages or muscular tissues) in bronchioles less than one millimetre in diameter ($\frac{1}{24}$ inch). After death the redness may disappear. The bronchial glands are often swollen, red and softened. In infants and old people, catarrhal pneumonia frequently supervenes either directly or by way of collapse of the lobule.

Symptoms.—The nervous system receives a slight shock at the onset, and this is expressed by a feeling of coldness, fever and malaise. Pains are felt about the chest, being due to the altered bronchi, or referred to the chest-wall through the communications of the bronchial nerves with the spinal cord. Cough, increased frequency of breathing and expectoration are symptoms, the cough is first dry and tearing, often paroxysmal, later becomes loose and expectoration easy.

The physical signs are usually rhoncal fremitus, especially in children, snoring and sibilant râles, without much alteration on percussion. Emphysema may cause hyper-resonance or if great even dulness.

The prognosis is worst in infancy, old age and in the presence of heart or lung disease.

The best treatment is rest in bed, the temperature of the room being kept above 60°. Sweating should be induced by copious libations of warm fluids, by hot air baths, and by diaphoretics such as liquor ammoniæ acetatis. A Dover's powder

often soothes the nervous system. Poultices, sinapisms and turpentine liniment are often valuable and grateful.

In the dry stage, ipecacuanha or antimony may be used to diminish distress, loosen the cough and lower the blood tension. In the loose stage, stimulant expectorants such as squills and balsams are valuable; in either stage sedatives such as opium, conium, prussic acid, henbane and bromides are useful to abate the frequency of coughing. During convalescence, any tonic is useful, the best being the syrup of the hypophosphites.

During the fever, broths, barley water and farinaceous gruels are the best foods, and the diet should be light until convalescence sets in.

CAPILLARY BRONCHITIS.

Increased dyspnœa, greater feeling and look of illness, with more obvious blueness, indicate that the smaller tubes are involved, and in infants and old people the symptoms are very like those of broncho-pneumonia. The gastric and intestinal mucous membranes appear to suffer, as shown by vomiting and diarrhœa or constipation. Sometimes the shock to the nervous system causes a condition of collapse, as seen in the prostration, low temperature and feeble frequent pulse, and from this there may be no rallying. The pulse-respiration ratio is deranged and may be as two to one. Coughing is apt to be feeble and ineffectual. The alæ nasi work the more vigorously, the more extensive is the affection. Death is not infrequent and may be caused by asphyxia or heart failure, but sometimes delirium, coma and convulsions may terminate life.

In addition to the treatment of acute bronchitis, these cases require free stimulation with most

careful nursing and feeding; small quantities of nourishing liquids being administered at frequent intervals. Sleep must be secured whilst, however, the bronchial tubes must be cleared and not allowed to become paralysed. Opium guarded by brandy may be used, but where a tendency to asphyxia and stupor exists bromide of ammonia with sal volatile is best.

CHRONIC BRONCHITIS.

Chronic inflammation of the bronchial mucous membrane is common during the degenerative period of life. A cough, some shortness of breath, with a variable amount of expectoration, are the symptoms, and they fluctuate in harmony with changes in the surroundings of the patient and with intrinsic changes such as indigestion, worry and anxiety. Transient indigestion, bad news or mental shock are as invariably associated with a change for the worse in the bronchitis, as if the bronchial mucous membrane had been exposed to the deleterious influence of cold and wet. Rheumatism and gout are causes. Like retro-pharyngeal catarrh, with which it may be associated, chronic bronchitis generally arises as the remnant of repeated acute catarrhs, though occasionally it lingers after one acute attack or even arises in an insidious manner.

The bastard peripneumonia (peripneumonia notha) is practically a subacute capillary bronchitis occurring during old age or second infancy; but the difficult expectoration of a rather abundant puriform secretion is a remarkable feature.

The treatment depends on the age and constitution of the patient, but a lowering plan of treatment must be avoided. Stimulant expectorants, tonics, cod-liver oil and malt, good food and a

little stimulant are the remedies, with iodide of potassium for the rheumatic and benzoate of lithia and colchicum for the gouty. Syphilitic bronchitis should be treated by mercury, iodides and iodine inhalations as well as by a nourishing diet.

PLASTIC BRONCHITIS.

Plastic bronchitis is a rare form of very chronic bronchial disease in which casts either solid or tubular are expectorated. The expectoration does not usually cause much distress unless the size of the casts is large, when attacks of hæmoptysis, dry cough and shortness of breath may be observed, sometimes associated with fever. Either sex and any age are liable. Tonics and carbonate of ammonia in the intervals, with alkalies and salines, and hot moist inhalations during the attacks.

MECHANICAL OR DUST BRONCHITIS.

Mechanical or dust bronchitis is characterised by habitual cough with recurring bronchitis leading to emphysema, and culminating more or less frequently in paroxysms of asthma.

Masons, miners, potters, flax-dressers, millers and plasterers are the subjects of this disease.

BRONCHIECTASIS—DILATATION OF BRONCHI.

Chronic bronchitis and emphysema may cause a little widening of the smaller divisions of the tubes, especially at unsupported parts like the

apices of the lungs. Cylindrical widening or fusiform bronchiectasis is distinguished by the dilatation involving uniformly a considerable length of tubing from a sacculated dilatation, in which a short piece of tubing is bulged considerably, whilst before and behind this globe the tube remains unchanged in calibre. These ectasias or bronchial aneurysms may be solitary or numerous. Their causes are very much the same as those of aneurysms of the vessels, viz., increased intra-pulmonary tension and disease of the bronchial wall. Any obstruction of a bronchus leads to accumulation of secretions and cylindrical bronchiectasis, most marked in the minutest bronchioles. Any chronic consolidation of lung is sure to lead to bronchiectasias because the cicatrisation widens the tubes as does also the inspiratory force. In collapse of lung, acquired or congenital, the bronchial tubes become dilated by the inspiratory force.

Paroxysmal cough with abundant expectoration often ejected with much difficulty and generally very offensive are the chief symptoms. Antiseptic inhalations such as eucalyptus, sanitas, terebene, iodine and stimulant expectorants, with plenty of support, constitute the treatment.

EMPHYSEMA.

The most important facts of emphysema are the destruction of elastic tissue and blood capillaries of the lungs; hence the deficient elasticity and consequent difficulty of expiration, the shortness of breath and tendency to blueness resulting from the lessened area of blood exposed to the air in the lungs and from the diminished intake of air.

VESICULAR EMPHYSEMA.

Vesicular emphysema consists in expansion of the air cells of the lungs due to intra-pulmonary tension and to destruction of the septa, resulting from the tension and from the impairment of nutrition of the elastic and other tissues. In atrophous or "small lunged" emphysema the impaired nutrition of the pulmonary tissues is the essential cause of the morbid condition; it only occurs in the degenerative period of life; both lungs are equally affected; they are smaller, lighter in weight and drier than natural.

The causation of other forms of emphysema is best explained by considering the intra-pulmonary pressure; some increase of this may occur during inspiration when any large extent of lung is solidified, as from collapse, phthisis, pleurisy, the force of inspiration being the same it is assumed that the force which should stretch the unexpansible lung adds itself to that expanding the sound lung, this is called vicarious emphysema. If the bronchial tubes be blocked by secretion or thickening of their walls a similar mechanism might obtain. The substantive emphysema of Laennec consists in distension of pulmonary lobules whose bronchial tubes are obstructed; it being supposed that air can get in during inspiration, but cannot escape during expiration. On the expiratory theory the intra-pulmonary pressure is increased during expiration, the glottis being closed intermittently or partially and more continuously, as in coughing, straining and playing wind instruments. The apices, anterior margins and edges of the lungs being less supported yield more to the distending agency.

It is perfectly possible that lung-tissue, like any

other tissue, may be especially poor in quality in certain individuals, and liable to primary degeneration—the degeneration and atrophy however occurring "secure permanence" (Jenner) for the emphysema. A rigid chest being incapable of further expansion gives all the physical signs of emphysema. The chief diseases causing emphysema are bronchitis, consolidation of any kind, whooping cough and croup.

In all cases of bronchitis an acute general emphysema or insufflation occurs, the elastic tissue is simply stretched, it only degenerates if the intra-pulmonary tension lasts.

In hypertrophous or large-lunged emphysema the lungs are everywhere expanded beyond the usual size, the colour is paler and the texture drier; it pits more easily and feels like an eider down; the air can be squeezed from part to part with greater readiness than in health, as the result of the wasting of the partitions. Chronic local emphysema is the result of a local morbid process, the outcome of obsolescent tubercle at one apex or developing around a local patch of consolidation.

Physical signs.—The hypertrophous variety is generally complicated by chronic bronchitis; the chest is enlarged, especially in the antero-posterior diameter, hence the "barrel-shape" or tendency thereto; the expansion is slight but elevation marked; the percussion note is hyper-resonant, the superficial cardiac dulness obliterated, and the liver dulness begins lower than normal; the breath sounds are simply weak, high pitched and divided if there is no bronchitis, the expiration being prolonged.

The *symptoms* are a feeling of shortness of breath and also tangible evidence thereof; the lungs are over-full and expiration is very difficult, especially if there be bronchitic obstruction, rigidity of the

chest walls, obesity and flatulent abdomen. Attacks of asthma and paroxysms of cough may occur. There may be some blueness of the face and nail beds. The right heart becomes hypertrophied and dilated as seen in the centric epigastric pulsation.

The *prognosis* is unfavourable in most cases; the best prospect exists in cases occurring in young children, and chiefly due to a whooping cough or catarrh which has not fully subsided.

Interlobular emphysema is like true surgical emphysema, and may lead to emphysema of the mediastinum and sub-fascial connective tissues of the neck and to pneumothorax. The air bubbles escape into the sub-pleural connective tissues especially between the pulmonary lobules where there is most space. Violent expiratory efforts, as in whooping cough or straining during parturition, may cause it. In slight degree it is most frequently seen at the post-mortem of children, and it seldom gives any anxiety during life.

Treatment consists in careful clothing and feeding with proper regulation of the habits of life. The prevention of catarrhs is frequently best effected by the choice of a warm climate in winter, like Bournemouth. The best medicaments are cod-liver oil and tonics. Cardiac and respiratory stimulants are invaluable; digitalis and strychnia, ether, lobelia, belladonna, and chloroform. Narcotics should be shunned as a rule.

PNEUMONIA.

Acute inflammation of the substance of the lungs is a serious disease of sudden onset and ushered in by febrile disturbance recalling many an acute specific fever. Indeed it may be regarded as a

fever with local manifestations in the lung. Males between twenty years of age and forty supply the largest number of cases because they are more exposed to its exciting and predisposing causes. Lowered vitality often induced by alcoholic or sexual excesses prepares the way for the exciting cause, usually a chill. Renal disease predisposes to pneumonia and makes its prognosis worse, but gouty pneumonia is less dangerous. It is a rule in prognosis to aver that double pneumonia with renal disease is sure to be fatal. Pneumonia often occurs in epidemics; is sometimes clearly traceable to septic insanitary conditions, and is believed by some to be contagious.

The relationship of pneumonia to the pneumococci is still doubtful. Each case of pneumonia may be described as consisting of three stages; first, that of engorgement or hyperæmia; secondly, that of red hepatisation; and thirdly that of gray hepatisation.

In the first stage the lung becomes full of blood, deep red in colour, still crepitant, but with its elasticity and consistence diminished, and it still floats in water. The physical signs corresponding to this degree are sometimes mere harshness of the breath-sounds with slightly deficient percussion-note, but these are indefinite, and the most important sign is "true pneumonic crepitation," which is a sound nearly resembling that produced by rubbing a lock of one's own hair between the finger and thumb close to the ear. In the second stage the lung becomes solid and enlarged, non-crepitant, softened, looking like liver, and pieces of it sink in water. The surface and section have a granular appearance due to the perfect stuffing of the air-cells with exudation, which is composed of a net-work of fibrin, in the meshes of which red blood corpuscles and white are conspicuous features. The physical signs appertaining to this

condition are bronchial breathing, bronchophony, and dulness.

In gray hepatisation the exudation has become more cellular, softened a little and fatty, and the granular appearance less marked; before being absorbed, the physical signs are the same as in the second stage with the addition of redux crepitation, *i.e.*, bronchitic râles in the smaller tubes, probably due to liquefaction of the solid stuff.

All through a genuine case there are rusty or blood-stained sputa, but especially at first, these have an exceedingly viscid tenacious character so that even inversion of the spittoon containing the sputa does not cause them to be detached.

In pneumonia the blood is hyperinotic as in acute rheumatism and diphtheria, so coagula may form in the right side of the heart or in the pulmonary arteries, and give rise to urgent dyspnœa or even to sudden death.

A pulse which is far more frequent than the temperature will explain, is a serious sign of cardiac failure. In the first case of pneumonia the author ever saw, though the patient was sitting up in bed seeming bright and cheerful, and not suffering much dyspnœa, Dr. Ringer, under whose care the patient was, warned the house-physician that the case despite stimulation might prove fatal; and this prognosis was given simply because the pulse was 140 and the temperature 101°.

Pneumonia generally terminates by crisis and free sweating after lasting about eight days.

The fever is high and reaches its acme within the first days of illness, a single severe rigor is common at the onset; pain in the side is often severe, and probably due to the accompanying pleurisy; cough and dyspnœa are generally present, and the pulse-respiration ratio may be altered to 2 to 1, the pulse being 120 and the breathing 60. In most cases the prostration of the mental

and neuro-muscular powers is remarkably great, the sense of illness being intense. The usual signs of high fever are also present; the urine is very deficient in chlorides, perhaps even more deficient than is the case in other acute inflammations and fevers; the exudation in the lungs contains much common salt (*see* Fever).

The right lower lobe is the commonest seat. If the apex is involved, as is not infrequent, delirium and mental symptoms are generally more pronounced than when the lower parts of the lung are affected. Delirium may occur at the onset with a rising temperature; it need not coincide with the acme of the fever, and curiously it often appears first during the crisis when the temperature is falling. Herpes of the lips and flushing of the cheek, if present, are generally situated on the same side of the body as the pneumonia. Jaundice may complicate pneumonia, especially when the lower lobe of the right lung is affected. Albuminuria is usually present, but only a trace if due to the pneumonia. A typhoid state is common.

The inflammation may resolve, may go on to purulent infiltration or to localised abscess, diffuse gangrene or to phthisis either acute or fibroid.

When arising in the course of typhoid fever or any exhausting illness the "hypostatic" pneumonia is prone to be latent, the symptoms being masked by those of the primary illness. In the old, in the feeble and in the child the exudation is said not to fill the air cells so tightly as in the stronger folk, hence the granular aspect on section of the lung is less marked and the lung is not so tense, resembling spleen rather than liver, it is called "splenification" instead of hepatisation.

But in infancy at all events the belief forces itself on one that the pneumonia is nearly always secondary to bronchitis, and then the packing of the air cells is not so great as in croupous pneumonia,

which, be it remembered, may, though rarely, occur in young infants.

The patient must be confined to bed in a well ventilated room, out of the way of draughts and the most perfect quiet should be enjoined. A dose of castor oil is the first thing to administer. Milk, beef-tea and liquid farinaceous diet should alone be allowed with plenty of cold filtered water or the bitartrate of potash imperial drink.

Pain should be relieved by fomentations, a leech or two, ice bag, strapping the side or even a hypodermic of morphia gr. $\frac{1}{6}$ injected under the skin over the seat of pain.

An occasional draught of citric acid and carbonate of ammonia, ten grains of each or a dram of solution of acetate of ammonia may be given in water every four hours. Brandy should be given if the pulse rate exceeds that proper to the temperature; each degree Fahrenheit of fever may raise the pulse 10 beats; if the temperature be 104° the pulse may be 120 without indicating stimulants; a very compressible and small pulse even if only 120 with the same temperature generally indicates that stimulants should be administered, and the more so if twitchings or tremors are present and the tongue tends to be dry.

Violent delirium should be arrested by douches to the head of quite cold water or by the wet pack. Bromides and opium may be used cautiously to produce sleep.

BRONCHO-PNEUMONIA.

Most common in infancy and early childhood broncho-pneumonia may occur at any age. It is secondary to the bronchitis of ordinary catarrh, influenza, measles, diphtheria, whooping cough.

Sometimes the pulmonary lobules are first collapsed and then inflamed. This form of pneumonia may originate from septic poisons either sucked into the air cells from the bronchi or reaching the lung tissue through the blood supply as in pyæmia, septicæmia and tuberculosis. Ordinary irritation from tubercles or new growths generally causes catarrhal rather than croupous pneumonia.

When the patches of lobular pneumonia are disseminated throughout the lungs it is impossible to distinguish it from capillary bronchitis. The alveoli are stuffed with large cells of epithelial type, and this strongly contrasts with the appearances of croupous pneumonia.

The fever is generally marked but not sustained, and by no means so regular as in croupous pneumonia; for each fresh patch of inflammation the temperature generally rises rapidly and then slowly falls until another rise indicating a fresh extension occurs. Speaking generally the contrast between croupous and broncho-pneumonia consists in the greater dyspnœa and the marked tendency to overloading of the right side of the heart; so that the alæ nasi work unduly, the surface of the body is very dusky, blueness is more common and sweating more evident. In infants much recession of the chest walls is observed during inspiration. Recession of the soft parts of the chest may occur from obstruction to the entry of air into the lungs at any part of the respiratory passages: as in large tonsils, laryngeal affections and mere bronchitis; the yielding character of the thoracic walls is the predisposing cause of this recession. It is necessary to insist on the fact that any impediment to the entry of air in the lungs in children will cause falling in of the soft parts of the chest wall, because some students find it difficult to believe that simple bronchitis, pleural

effusion and pulmonary collapse may be causes of bilateral recession.

When broncho-pneumonia is confluent, physical signs of consolidation may be obtained—dulness, bronchial breathing and bronchophony. The ordinary signs of a small patch of catarrhal pneumonia are sharp crepitations and perhaps bronchial breathing. We say "perhaps" advisedly because it depends on the size of the patch of solidification and upon its nearness to the surface. Common sense suffices to teach us that a fair sized solid area in the middle of the lung might not be manifested by any physical sign.

Pain due to associated pleurisy is common in the confluent variety, and perhaps the curious rhythm of respiration called "expiratory" may be partly due to this, there is in this an unnatural pause between inspiration and expiration, the latter act being attended with a panting or sighing sound.

The more extensive the broncho-pneumonia, the greater is the liability for it to become chronic, and to run a long course of many months, terminating in fibroid changes and dilated bronchi, or actual phthisis. Moreover, such severe disease often ends fatally whilst in the acute stage, or from undergoing widespread suppuration; some cases of galloping phthisis being of the latter description.

Danger may be apprehended from the suffocative character of the affection, and a typhoid state may cause anxiety. Suppurative destruction of the lung is manifested by the usual symptoms: increased debility, hectic fever, emaciation and greater rate of pulse. Diarrhœa is very common, especially in cases of septic origin, or there may be obstinate constipation and a comparison of broncho-pneumonia with typhoid fever is instructive from these considerations; the spleen, how-

ever, is seldom enlarged, and there are no rose spots, though tympanitis may embarrass the breathing.

The treatment is the same as for capillary bronchitis; stimulation is carried out on the same principles as in croupous pneumonia.

After all acute chest affections, much benefit usually results from a change of air to a warm seaside place, such as Bournemouth, Ventnor or Torquay, with tonics especially strychnia, cod-liver oil and steel wine.

INTERSTITIAL PNEUMONIA—FIBROSIS.

Interstitial pneumonia may occur alone as a separate disease called cirrhosis of the lung, only one organ being affected, but a certain amount of fibroid change occurs in all cases of chronic disease of the lung. Much pigmentation of the diseased tissue is usually present, and sometimes the term anthracosis is used to denote this; miners and knifegrinders may suffer from such an affection. Fibroid changes often follow broncho-pneumonia or chronic pleurisy with collapse of the lung, the greatly thickened pleura seems to be the starting point of a scarring process which spreads along the interlobular partitions. Bronchiectasis should be considered in this association. The lung is greatly increased in consistence, being almost gristly, and its colour is often gray, so that the term iron-gray induration is very appropriate.

Such chronic forms of phthisis often do not give rise to fever, and the emaciation and debility are very slow in developing.

Cough and shortness of breath with pain are usually present, whilst if there be dilatation of the tubes, the signs of bronchiectasis may be noted.

Since the lung has but little elasticity, we find the diseased side of the chest hardly moves at all, becomes retracted, yields a wooden or tubular percussion note; vocal fremitus is often diminished owing to the thick pleura and thick fibrous tissue, the diaphragm and heart are displaced by the contraction of the lung and pleura. The breathing may be simply weak, or in places bronchial breathing with bronchophony and pectoriloquy may be heard.

PULMONARY COLLAPSE.

Congenital atelectasis or acquired collapse of lung gives the same physical signs as any other consolidation. It frequently results from simple bronchitis in infants, and it occurs from compression in cases of pleuritic effusion, or when a bronchus is occluded as by the pressure of an aneurysm.

The atmospheric air in any case no longer reaches the pulmonary alveoli, and that air which remained in the pulmonary alveoli soon gets absorbed—just as in cases of Eustachian catarrh, the tympanum gets devoid of air.

The amount of collapsed lung is very variable in bronchitis, being dependent on the strength of the respiration, on the flexibility of the chest-walls, and on the size of the child; the younger the child is the smaller are its lungs, the narrower its tubes, the softer its chest-walls, from which circumstances, extensive collapse more readily occurs.

Collapsed lung differs from inflamed lung in being of very tough consistence, of very dark blue colour, and in being smaller in size, so that a collapsed lobule is below the level of the sur-

rounding surface. Clinically it differs from pneumonia in not raising the temperature, but it often is inflamed with the usual clinical and pathological consequences. Otherwise, when marked, collapse causes much the same symptoms and signs as broncho-pneumonia.

It will be observed that extensive disease of the lungs diminishing the area for aeration of the blood always causes not only shortness of breath and cyanosis, but also a feeble voice and an ineffectual cough.

ABSCESS OF LUNG.

Limited suppuration of the lung tissues may proceed from acute pneumonia of any cause—traumatic, croupous, catarrhal, pyæmic and embolic, and from circumscribed gangrene. Whereas pyæmic and embolic abscesses are generally multiple, primary abscesses are usually solitary. The shape of those due to catarrhal pneumonia is necessarily tree-like.

The symptoms are those common to all suppurations. The physical signs, if any, are those of a cavity. The treatment is that of abscess anywhere; disinfectant inhalations and voluntary coughing with plenty of fresh air are also useful.

GANGRENE OF LUNG.

Necrosis of lung may be circumscribed or diffuse; the former is most common; the lower lobes and superficial parts of the lungs are most frequently affected; the parts have a most offensive odour, are of a purplish green colour, and have a tattered

pulpy aspect; generally the border of the gangrenous patch is bounded by inflammatory changes; abscess cavity may result from expectoration of the slough; the pleura may rarely give way and pyo-pneumothorax result. In the diffuse form inflamed, congested and sloughing lung are inextricably mixed.

The causes are acute pneumonia, inhalation of noxious gases, pressure from aneurysms or mediastinal growths, foreign bodies in the air passages or lungs, alcoholism, insanity, pharyngo-laryngeal palsy, small pox, measles, typhus, pyæmia, cancer of mouth or larynx, cancrum oris, bursting of abscess into a bronchus.

The chief symptom is the gangrenous odour of the breath; some of the sloughy material may be ejected. From bronchiectasis the history and the presence of elastic tissue in the sputa serve to separate it. Death is apt to ensue from exhaustion of the vital powers.

There may not be physical signs of a cavity.

The treatment is like that for abscess.

CANCER OF THE LUNG.

If a primary disease of encephaloid variety the physical signs are like those of extreme pleural effusion, one lung being involved the absolute dulness extends beyond the middle line of the sternum, the heart is displaced, the vocal fremitus diminished or lost and the breathing weak. These are the physical signs when the disease is fully developed. It is most common in males above thirty years of age, but is altogether a rare affection.

Secondary sarcomata and carcinomata occur after disease of the long bones or in connection with sarcoma of other viscera, including the medi-

astinal glands; pleural effusions, often sanguinolent, may accompany them. Extensive pleural adhesions are also common.

"Red-currant jelly" expectoration or hæmoptysis, pain, cough, dyspnœa with emaciation, anæmia, debility and night sweats, are more marked in primary than in secondary cancer.

The physical signs depend on the situation and size of the carcinoma.

ASTHMA.

Asthma is best regarded as an epileptic discharge causing the plain muscular tissue of the bronchi to contract spasmodically. It may be called a respiratory epileptic fit and is manifested in attacks of shortness of breath of fearful intensity. Electrical stimulation may cause closure of the smaller divisions of the bronchial tubes which are highly muscular channels.

The lesions of lung and heart found after death in cases of asthma are secondary consequences, not causes of asthma. Nevertheless asthmatical attacks may supervene in chronic bronchitis, emphysema and other lung diseases in which the elastic tissues are destroyed. The relatives of asthmatics are often of neuropathic stock; neuralgia, megrim, epilepsy, are common in their family histories; so also are eczema, gout and urticaria. Urticarial swelling of the mucous membrane is regarded as the cause of asthma by some; but urticaria would also have to be explained, and it may be of nerve as well as of blood origin.

Asthma is rather more common in males and is apt to appear first during the first decade of life. Any bronchial or pulmonary irritation may provoke an attack; therefore any cause of bronchitis,

pneumonia or any disease of bronchi or lung. Reflex irritation may lead to asthmatic attacks: irritation of the fifth nerve, of the gastro-intestinal tract, of the uterine or of the cutaneous nerves. Any irritation of the respiratory centres or nerves (vagi) may excite asthma, including any toxic agent having a predilection for these parts of the nervous system. Dyspepsia, nasal polypi, loaded bowels, tumours of mediastinum and base of brain, are examples of different modes of irritation causing asthmatic attacks.

The asthmatic physique is rather characteristic; the features denote seriousness, the shoulders are high, the back rounded; there is leanness of body, but a wonderful paroxysmal capacity for mental work—the typical asthmatic is a thin neurotic. Sometimes the asthmatic is of the fat gouty apoplectic type.

The asthmatic attack may, like epileptic fits, appear at any hour and the cause may not be obvious. Like attacks of whooping cough, laryngismus stridulus and spasmodic croup, it prefers the night time, for reasons not properly explained, but the common fact that all these are affections of the respiratory nervous apparatus is interesting. A sensation of constriction reminding one of that felt in angina pectoris and in spinal diseases, followed or accompanied by wheezing, may announce the onset of the fit; rarely there is no such aura or the warning may be a disagreeable dream.

The asthmatic paroxysm is very alarming and the patient's appearance is very distressing to witness. Open mouth, facial spasm, raised shoulders, body bent forward, hands and shoulders fixed, are obvious features; short violent jerky inspiration and prolonged feeble laboured expiration both fail to give relief; sweating often breaks out, the breathing may not be quickened in number, but the pulse becomes frequent,

small, and often irregular: there is some cyanosis and the temperature is not raised. The severity of the seizure is maintained for some minutes or even for hours, but is relieved by short intervals of comparative freedom. Coughing with expectoration of viscid mucous pellets ends the attack. As after epilepsy and headache a copious flow of watery urine may be noted.

Signs of bronchitis are apt to remain after the attacks, which usually take on a periodic character, recurring weekly or monthly or more frequently. Like epilepsy and gout, asthmatic paroxysms tend to become more frequent but less severe. Emphysema, with embarrassment of the right heart, is likely to follow with the usual effects. With care, asthmatics may live to a fair age, even when the disease dates from childhood. Asthma is not a common accompaniment of tubercles, Bright's disease, or cancer.

According to the source of the irritation, many varieties of asthma are recognised: idiopathic or true spasmodic asthma, simple bronchitic, dust and hay asthma, make a catarrhal group; peptic asthma is divided into gastro-intestinal and humoral or metabolic (liver) and gout; cardiac asthma; cruptive, associated with eczema and urticaria, uræmic and toxæmic asthma.

Treatment.—The patient's own views of the best mode of relieving his attacks are worth consideration.

A change of residence, healthy physical and mental surroundings, medicated sprays and baths, and regulation of the digestion, are the principal points. During the attack, if necessary, an emetic of sulphate of copper and an enema may be ordered, and in the severe attacks, a hypodermic of morphia. Inhalations of Himrod's powder, nitre paper, nitrite of amyl, nitroglycerine, stramonium cigarettes or tobacco; a cup of strong

black coffee; half a drachm of tincture of lobelia, or fifteen minims of fluid extract of grindelia robusta may be prescribed.

As medicines in the intervals, arsenic, quinine, iron, and salicylate of soda.

In catarrhal asthma, five grains of iodide of potassium, and a quarter of a grain of extract of stramonium, every three or four hours during the day, are very valuable.

PHTHISIS—PULMONARY CONSUMPTION.

The best way of viewing the pathology of phthisis appears to be thus:—The lungs tend to be destroyed by a morbid process, which may begin as a peculiar form of inflammation producing tubercles, or as a simple inflammation (generally catarrhal pneumonia), and this affords the necessary nidus for the growth and development of the tubercular virus. So that the end is the same, bacilli are always present, and there is in the affected lung tissue tubercular formations mingled with simple pneumonic patches, congestion and bronchitis; and if the process has lasted any length of time, some scarring, or at least an overgrowth of fibroid tissue results, which is either transformed tubercle, transformed pneumonia, or that fibroid stuff which results from any chronic congestion.

In miliary tuberculosis the course of the illness often resembles that of typhoid fever and the diagnosis may be very difficult. When the lungs are "stuffed" with miliary tubercles, cyanosis and rapid breathing are marked symptoms, and the percussion-note may have a clear tracheal quality; there may or may not be signs of consolidation and bronchitis.

Acute phthisis is simply catarrhal pneumonia going on rapidly to suppuration, with corresponding pulmonary destruction, and there is nothing special about the symptoms, which are those of rapid suppuration, chills, fever of hectic quality, tendency to adynamia and the typhoid state, profuse sweats, rapid loss of strength, flesh, and blood, with cough, shortness of breath, and expectoration of pus, mucus, and perhaps blood. The physical signs would be those of consolidation and cavities with liquid contents.

Treatment is that of the typhoid state.

Iced compresses, hypodermic injections of atropine; quinine, powdered digitalis and opium in a pill, one grain of the first, half a grain of the second, and a quarter of the third, every three hours. These cases of "galloping consumption" often prove fatal in a few weeks.

COMMON PHTHISIS.

The course of common phthisis is varying and variable, nothing certain can be predicted of any case, but in the same family the different phthisical individuals are apt to show resemblances in the nature and course of their illness.

Bronchitic signs are to be looked for at the bases; phthisis at the apices of the lungs; one apex is more diseased than the other; if one lung only is diseased, the disease is called cirrhosis of the lung.

Consolidation, liquefaction, excavation and scarring, are the main processes to be seen or inferred to exist in phthisis.

The alveoli and the peri-bronchial tissues are the special seats of the tubercular growths, which are always associated with more or less con-

gestion, bronchitis, and pneumonia. Cavities may result from bronchiectasis, as well as from excavation of lung. The branches of the pulmonary artery, and perhaps the bronchial arteries, like the bronchi, and from similar causes, *i.e.*, scarring of their walls, become ectatic, and form aneurysms, which are most common in chronic cavities, because chronicity is always associated with cicatrisation.

The symptoms vary, especially at the onset, which may be by dyspepsia, by loss of flesh, loss of strength, amenorrhœa from loss of blood, cough, diarrhœa, shortness of breath, or hoarseness.

One or more of the local symptoms may be absent: pains and tenderness about the chest, sometimes muscular, more often neuralgic or pleurodynic. Cough of variable characters, or expectoration of any kind, but hæmoptysis and nummulated sputa of opaque green appearance are most important. Elastic tissue is often difficult to find, even after careful maceration of sputa in caustic soda and potash; it signifies destruction of genuine lung tissue; tubercular bacilli may be stained rapidly by drying sputum on cover slips, immersing them in warmed fuchsin solution for ten minutes, cleansing in nitric acid solution (one to three of water) and after washing, staining the groundwork with methyl blue, then, after drying, mount dry in Canada balsam.

The *general symptoms* are those due to suppuration and inflammation and fever. Loss of strength, flesh and blood will vary directly with the acuteness of the lung disease and so will the fever. Very chronic phthisis, like cirrhosis of the lung, liver and kidney, is practically afebrile, and the more chronic the process the more the patient tends to keep his weight, his strength and his blood (*see* the Symptoms of Fever).

Hectic fever, night sweats, bulbous finger and toe ends, incurved and filbert-shaped nails may be specially mentioned.

The chief complications are tubercles and their effects in the intestines, spleen, larynx and other viscera. Lung suppuration causes a fatty liver or albuminoid disease of many organs. Fistulæ near the anus and phlegmasia from thrombosis of the femoral veins need to be mentioned.

Small lungs are more prone to become phthisical than others. These lungs largely determine the shape of the chest. The alar or winged thorax with projecting scapulæ has vertical ribs, an acute costal angle, great length and little breadth. Sometimes the thorax is *flattened* so as to be wide, but with a very short antero-posterior diameter.

Over the apices of the lungs in phthisis depressions, flattenings and want of movement may be seen. The first physical sign of phthisis may be a râle at one apex, or weak or jerky cogged-wheel inspiration. Bronchial breathing may be distinct quite early, other physical signs met with are indicative of cavity or consolidation; vocal fremitus is generally increased, but may be diminished if there is much fibroid tissue or if the cavity does not communicate with the bronchi.

Treatment.—Warm woollen clothing, pure fresh air, avoidance of fatigue and of enervating occupations.

Plenty of nourishing food stopping short of giving the digestive system more work to do than it can undertake. In many cases the crux of the treatment is the maintenance of the digestion. Various invalid foods often prove of much service. Mellin's food, Denaeyer's peptones, beef teas, veal and chicken tea, underdone meat, custards and other light food may be prescribed. As much fat as possible should be taken by the patient. Malt and cod-liver oil may agree, or either may be

taken alone. Pancreatic emulsions, Loeflund's Cremor Hordeatus, Kepler's Malt and Malt and Oil are valuable preparations. Cod-liver oil may be prescribed in many ways, small doses should be prescribed at first. It may be administered in many vehicles such as the various patented emulsions with hypophosphites. Scott's and Mellin's are useful.*

Indigestion, diarrhœa, constipation, leucorrhœa, hæmoptysis, should be managed as directed elsewhere.

Directions for treating cough and sweating will be found in the therapeutical index.

Counter-irritants of sinapisms, poultices, liniments and flying blisters are very useful in relieving distressing sensations, muscular pains and the like. Mountain air may prove of value in certain cases. But cases in which phthisis is rapidly advancing are usually not suitable; nor those in which hæmoptysis has frequently occurred; nor cases in which the nervous system suffers severely, and the patient is very irritable and even suspicious —so-called erethitic phthisis.

Laryngeal phthisis does not do well as a rule at high altitudes, perhaps because the disease is usually too advanced. Madeira, Algiers, and the Canary Islands suit some cases and the winter may be passed in them. Sea voyages often prove of much service.

MEDIASTINAL DISEASES.

Emphysema of the connective tissue is common after tracheotomy, œdema may occur, and inflammation with suppuration may spread downwards from the neck beneath the cervical fascia.

* See also Author's *Treatment of Disease in Children.*

Abscesses may result from tubercular disease of the glands, from caries of the spine and in connection with œsophageal disease.

Other diseases are simple large glands, malignant tumours and aneurysms.

Mediastinal growths may be primary or secondary and either sarcoma or carcinoma; sarcomata generally lymphomata are more common in females and children; true cancer is very rare and most common in males after middle life. They show a remarkable tendency to spread along the lines of least resistance when once they have burst through the glands in which they originated; guided by the bronchi and vessels they infiltrate the lungs in dendritic fashion; occasionally sarcomata may be encapsuled and not infiltrating.

Pain and uncomfortable sensations are usually experienced in the chest or referred to the epigastrium. Emaciation always occurs, but is seldom very extreme. The pressure symptoms are more persistent and less changing than in aneurysm or large pericardial effusion.

A cough resembling that of whooping cough may be present; the physical signs of mediastinal tumours are often slight; pain, tenderness and fever are sometimes observed.

Paroxysmal dyspnœa is, during the early stages, less frequent than in aneurysm, but shortness of breath gradually increases and remains constant. Cough generally dry and peculiarly metallic or hoarse is often an early symptom; though serious hæmoptysis is rare, a red-currant jelly-like expectoration is often present even in the early stage, when it is probably due to congestion of the bronchial veins. Dysphagia is mostly more common and more lasting than in aneurysm. Venous engorgement of the upper parts of the body and large veins on the thorax are very commonly present. Fever is absent as a general rule.

Large glands should be looked for in the neck and axilla, and, if movable, indicate lymphoma rather than carcinoma.

The following signs may be looked for:—

An anxious sometimes swollen face, increased frequency of breathing and pulse, some prominence of sternum, displacement of the heart, percussion dulness extending to one side and bounded by lung-note, impulse communicated from the aorta, increased vocal resonance and fremitus over the growth, a systolic murmur, bronchial breathing, stridulous rhonchus, feeble or absent breath-sound in a lobe of one lung from compression of a bronchus, with impaired movement. The stridulous rhonchus may be heard by a bystander, the stridor attending both inspiration and expiration. When the lung is much affected the signs are like those of an extreme pleural effusion; indeed a pleural effusion may complicate the new growth.

In diagnosis the possibility of an abscess, of a syphilitic stricture of one bronchus, and of an aneurysm, must be borne in mind.

An extensive area of superficial dulness, signs of venous obstruction, absence of expansile pulsation or bruit and of disease of the vessels; presence of large glands or tumours elsewhere in a patient under the age of thirty are in favour of the diagnosis of growth as against aneurysm.

Most primary diseases of the mediastinum are lympho-sarcomata, and the curious way in which all the tubes, vessels and nerves in the mediastinum may be soldered together by the infiltrating new growth is most remarkable, the whole intervening space between the various structures being accurately filled by the new material which may invade the walls of the various channels permeating it.

PLEURISY.

Often resulting from a chill, simple pleurisy may set in suddenly with a rigor, which is more apt to be repeated than in pneumonia. Predisposed to by rheumatism and Bright's disease, pleurisy may be simply inflammatory, like a catarrh, but though latent, tubercles may have been present. Pain, often severe, is always complained of; there need be no cough or expectoration; the cough is short, single, hacking, and painful. The temperature is not so high, and the patient is not so prostrate as in pneumonia. There is but little deficiency of the percussion note, the breath sounds are weakened, and friction of grating character may be heard over the seat of pain.

In left sided pleurisy friction of cardiac rhythm may be heard. If the pleurisy is not followed by fluid effusion, it is called dry or plastic, which is most common in tubercular cases.

Pain ceases or changes its place as effusion comes on, and is not increased as formerly by breathing or coughing. The side now moves much less than before, whilst the other lung increases its excursions; friction disappears, or may be heard higher up, dulness of absolute character called "flatness," loss of vocal fremitus, almost inaudible breath sounds, are noted over the fluid effusion, which accumulates first at the lowest parts of the axilla and base of the thorax; the heart is displaced, especially in left sided cases.

In moderate effusion not extending above the third rib, a triangular area of resonance may be observed in front and behind; the upper limit of dulness has an S shape, starting upwards from the sternum to the axilla, and then downwards to the spine; the resonance in front is sometimes

unusually tympanitic "Skodaic," and in the "dull triangle" behind the percussion-note contrasts strongly with the flatness of the percussion-note over the fluid.

The apex in front and behind may yield a tubular note when the effusion is more extensive, or there may be absolute "flatness" throughout, either from fluid effusion or from the lung in the triangular areas being œdematous or solid. The dulness in extreme effusion tends to encroach on the median line, especially at the third and fourth cartilages, hence a difficulty sometimes arises in diagnosing effusion from mediastinal growth. The dislocation of the heart is invariable, unless this be prevented by adhesions or consolidation of the other lung.

The diaphragm and abdominal viscera are often not dislocated downwards, indeed it seems that a positive intrapleural tension must first develop before this can occur; the heart is displaced not so much by positive intrapleural pressure, as by the loss of balance between the aspirating effect of the two lungs on the mediastinum, the heart being the index to the position of the mediastinum. A bruit from cardiac displacement may be heard. The side of the chest may be obviously enlarged, and may be measured by the cyrtometer; measurements may not show much difference, but the whole side being rounded its capacity must be increased, inasmuch as a sphere holds more water than a triangle. Fluctuation may be felt and true œgophony may be heard behind; the whispered voice is often well conducted through serous effusion, but Baccelli is in error in supposing that pus does not sometimes conduct it equally well.

A blood streaked viscid sputum, with crepitant sounds and a suffocative cough, are signs indicating that the intrapleural pressure is threatening the circulation, and syncope may be imminent.

The fever seldom lasts longer than two weeks, and if at that time the patient continues feverish and ill, with no appetite, furred tongue, increasing weakness, emaciation, anæmia, and sweating, suppuration has probably occurred. Redness, œdema, and increased tenderness, are local signs of suppuration; clubbing of the fingers and toes may occur, especially in children.

The fluid recedes slowly, the lowest part of the axilla or the base being the last to present an area of dulness with the convexity upwards.

In pleurodynia and intercostal neuralgia, there is no fever, friction, nor sign of effusion. From pneumonia, which often complicates pleurisy, the diagnosis is seldom difficult.

The treatment of pleurisy resolves itself into lowering blood pressure generally, and relieving symptoms; the former object should be attempted with a view to limit effusion and exudation, since the dilatation of vessels in the pleura, due to the inflammation, offers a place of leakage, especially when the general blood pressure is raised by vaso-motor contraction of all the non-inflamed vascular territories. Aconite may be used for the purpose, in doses of five drops, given cautiously every hour, for a few hours only; or a dose of sulphate of magnesia and soda, with a diaphoretic and diuretic mixture of citrate of potash and acetate of ammonia, may suffice. In the early stage rest in bed is imperative, and a liquid diet of milk, beef-tea, and gruel, should be ordered.

If the pain is severe, and hot fomentations fail to relieve it, a leech or two is useful, but should only be used during the first days of pleurisy; a blister and a hypodermic of morphia may be employed, if there be no Bright's disease. As a rule, after increasing for about ten days, the effusion subsides of its own accord. If pain reappears, strapping the side affords some relief.

Promotion of absorption is favoured by counter-irritation, diuretics, especially iodide of potassium, ferruginous tonics, and change of air.

After two weeks have gone by and absorption appears to be in abeyance, the advisability of withdrawing fluid should be considered. If the effusion rises as high as the second rib and there is ground for believing that positive intra-thoracic pressure, hindering the heart's action and compressing the lung, exists, aspiration should be performed. If the effusion is purulent, it must be removed, and incision with drainage and even large resection of the ribs may be needed; the surgeon who thoroughly understands antiseptic surgery should be allowed a free hand.

Pleurisy may become chronic in many ways; the effusion may remain unabsorbed for many months and perhaps years, especially in those whose chests are large and rigid; in these cases the lung has been so long retracted or the exudation on its surface has been so strong, that proper re-expansion of the lung cannot occur; supposing that the fluid should be absorbed faster than the lung can expand, the mediastinum must be drawn over, the diaphragm drawn up, and the thoracic wall must sink in, as the effects of unbalanced atmospheric pressure; these processes, however, can only occur within certain bounds, if the wall of the chest is very rigid a cavity between the lung and it must remain filled either with fluid or with solid exudation. Sometimes, indeed both pleural surfaces have enormously thick coatings of organised lymph; and such "thickened pleura" yields the physical signs of pleuritic effusion. Almost every necropsy brings to light some pleural adhesions which are in most instances the evidences of a past acute pleurisy.

In all acute inflammations of serous or synovial cavities hyperæmia is the first morbid sign, fol-

lowed by desquamation of the endothelium and by a variable amount of solid and fluid exudation. Vascular loops grow from pre-existing vessels into the exudation, and by their means the opposed visceral and costal pleuræ may become organically united; on stripping off adhesions it may often be noticed that many vessels of good size run parallel to one another.

EMPYEMA.

Empyema is suppuration within the pleura, and the inflammation producing it is usually of a different nature from that causing a serous effusion; many assert that a serous effusion tends to become purulent, but it is far more probable that the inflammation starts with different potentialities: as in inflammations in children, in scarlatina, in puerperal fever, and other blood poisonings, and in certain debilitated constitutions. When an empyema forms it may fill the largest part of the pleura or be "loculated" at one or many parts; it may point in any direction, one "weak spot" is the fifth space in the nipple line; above the clavicle, in the first space, over the sternum, high up in the axilla are some of the rarest spots for pointing. A bronchial fistula may result from the abscess bursting through the lung, or a fistulous tract may remain permanently through the chest wall; in children much reason exists for the belief that pus can be absorbed; fatty degeneration of the solid elements of the pus makes absorption more easy. But a residual abscess may remain and become caseous or even partly cretaceous. This should not be allowed, as such a focus may be a favourable soil for tubercle and may be the starting point of general tuberculosis—just as is supposed to happen more commonly when caseous bronchial glands exist.

PNEUMOTHORAX.

Pneumothorax or the presence of air in the pleura is a rare affection most commonly due in medical practice to rupture of a phthisical cavity. Some cases of pneumothorax do occur in previously healthy or in emphysematous people, from simple rupture of alveoli.

The physical signs of pneumothorax are like those of large fluid effusion, with the single exception that there is generally hyper-resonance of the percussion note: weak or absent breath sound, loss of vocal fremitus, diminished movement, fulness of the affected side, and dislocation of the heart.

When effusion of fluid comes on, as is the general case, in phthisical pneumothorax, "Hippocratic" succussion sounds on shaking the patient may be heard on auscultation, and "flatness" of the percussion note will obtain in the most dependent parts of the pleura. On auscultation the bell sound produced by striking two coins on another part of the chest wall may be heard; or metallic tinkling due to fluid dropping on to a fluid surface, or the feeble breath sound, the voice and the cough may have a brassy or amphoric quality—even if the perforation of the lung does not remain patent.

As in all sudden events a shock occurs to the system at the moment of bursting of the lung, and this shock with severe pain and shortness of breath, often follow suddenly on a fit of coughing, but pneumothorax has developed during sleep and quietude with the usual symptoms. The dyspnœa may make the patient sit up—orthopnœa; sometimes asphyxia threatens. The pulse tends to fail and syncope has occurred; the temperature may sink a degree or two.

A sixth of a grain of morphia with a hundredth of a grain of atropine, should be injected beneath the skin of the affected side to relieve shock, pain, and dyspnœa; ammonia and ether should also be administered whilst the shock lasts. "If we bear in mind, that the chief way in which positive pressure is brought about within the pleura, is by the thoracic wall on the affected side being expanded to the position of extreme inspiration and recoiling upon the air pent up in the pleura, the advantage in these cases when the excess of air has been removed (by fine aspirating needle), of strapping the affected side so as to control inspiratory movement, becomes obvious" (Powell).

A dose of saline aperient to relieve the inevitable congestion of the right side of the heart and liver, is sound treatment. And the secondary pleurisy should be treated by fomentations and tonics.

The development of pneumothorax by causing collapse of the lung and thereby diminishing the flow of blood through it, tends to arrest the phthisical changes. A healthy pleura appears to have a remarkable power of absorbing atmospheric gases.

Hydrothorax, or water in the pleura, occurs as a side product of general dropsy, whether due to heart failure or Bright's disease; the effusion is usually greater on the left side in heart disease, it embarrasses the breathing and the heart; its physical signs are practically the same as those of pleuritic inflammatory effusion; relief may be afforded by paracentesis.

Hæmothorax, or hæmorrhage into the pleura, in medical practice is rare, and then mostly due to bursting of an aneurysm. A sanguinolent serous effusion is not uncommon, and though mostly due to sarcoma, carcinoma, or tubercle, may occur in simple inflammatory effusions, and in alcoholic subjects.

SPECIAL SYMPTOMS OF HEART DISORDER.

In perfect health we are not aware of being possessed of a heart, if this organ is diseased or if the nervous system is too sensitive, then the conscious existence of a heart may be felt.

It may be a single curious sensation as of a jog or jump, it may be repeated attacks of fluttering, or a creeping sensation, or the heart's action may feel exceedingly violent (palpitation), and this may occur in paroxysms without obvious cause, or it may be continuous or only brought on by exertion. Palpitation may occur from any disease of the heart muscle or membranes, but is not invariably present with such affections. Most frequently it is a functional neurosis, and often due to gastric or uterine irritation in neurotic subjects. Emotional palpitation must be known to all. Tea, coffee, alcohol, tobacco and other poisons in the blood may excite it. It may cause hypertrophy.

Palpitation about puberty may be due to the failure of the heart to grow at its proper rate.

Proving its nervous origin like headaches and epilepsy, palpitation may subside with an abundant flow of urine, or may end in sleep.

From the same causes, *irregular* and *intermittent* cardiac action (arrhythmia) may arise. Meningitis, brain tumours, acute yellow atrophy of the liver, gout, uræmia and other toxæmias may slow the pulse or quicken it, or cause it to be intermittent. An intermittent or irregular pulse may be peculiar to the individual, and is of no importance except that some authorities state that such do not bear acute diseases so well. A *pulsus rarus* is also observed during the early stage of convalescence from acute disease and after parturition. The

pulsus alternans is a term used to denote the regular occurrence of beats of different force; *pulsus bigeminus* the regular coupling together of beats in pairs—these are illustrations of allorrhythmia.

Syncope or loss of consciousness from failure of the heart may occur from any of the causes above mentioned. Often enough it is a real epilepsy, and in common "fainting" from the infliction of pain, one often finds the pulse good throughout notwithstanding the blanched face; and a few clonic spasms of the limbs may be seen.

Cyanosis or blueness is due to imperfect aeration of the blood, often combined with passive venous congestion, and sometimes with a mixing of the arterial and venous streams from cardiac imperfections. So-called morbus cæruleus or blue disease is generally due to the last cause, and is of congenital origin. In cyanosis the finger and toe ends, the nose and ears, may become swollen or clubbed. In slight form there is merely duskiness of the countenance, blueness of the nail-beds, ears and nose.

Paroxysms of palpitation, dyspnœa and syncope are common in the congenital variety, the actual temperature of the body is not necessarily below par, nor is there necessarily any mental torpor, though this is more common in acquired cyanosis. Congenital or acquired heart disease generally prevents the proper growth and development of the body; so the height and weight and chest girth may be below the normal, and the signs of puberty diminished or altogether absent. A false pigeon breast may be chiefly due to cardiac enlargement, but is partly brought about by the failure of the development and growth of the thorax as well as by hypertrophy of the tonsils, and pharyngeal adenoid growths.

ANGINA PECTORIS.

The points to be remembered about this breast pang is the pain, the sense of suffocation, and thirdly, a sense of impending death, a trinity of sensations each easily definable from the other. In its girdle-like distribution, the pain recalls the girdle sensation of many spinal cord diseases.

This breast pang comes on mostly as a consequence of exertion, usually after the stomach is full, and especially when the heart muscle is most taxed as in going up hill or against the wind; its duration varies from a few seconds to many hours.

We do not know what the pathology of angina is, whether a cramp of the heart muscle, a neuralgia of the cardiac plexus, or a paralysis of the heart muscle from excessive arterial tension due to constriction of the arterioles. Its most frequent morbid association is fatty degeneration of the heart muscle, and generally such as results from atheroma and calcification of the coronary vessels, hence the frequency of aortic disease. It is supposed by some that arterial tension has caused distension and paralysis of the healthy heart muscle.

The typical cases occur in people over 40 years of age and with gouty constitutions, but similar pains not ending fatally may be felt by young men and bloodless women (pseudo-angina). The pain tends to radiate down the left arm and may reach to the fingers, it may be accompanied by vasomotor changes and a feeling of numbness. The prognosis is not very favourable, but judicious treatment may prolong life considerably. First attacks are not often fatal.

Treatment.—Nitrite of amyl and nitroglycerine are the best remedies, they are antispasmodic and

though they dilate the arterioles, it does not prove that spasm of the arterioles is the pathology of all cases, for they may relieve spasm of the heart. Rest and careful regulation of the diet should be enjoined.

Sinapisms, fomentations, turpentine stupes and hypodermic injections of morphia may be used locally; brandy, ammonia, belladonna and opium are other internal remedies.

GRAVES' DISEASE.

FREQUENT action of the heart, enlargement of the thyroid gland and exophthalmos (proptosis) are the three chief signs of Basedow's disease, exophthalmic goitre. Sometimes there is retraction of the upper eyelid (Stellwag's symptom), and the upper eyelid may not follow accurately the movement of the globe of the eye when the patient looks downwards so that a piece of the sclerotic may be visible between the cornea and the eyelid (Von Graefe's symptom). We do not know whether the disease is primarily one of the medulla oblongata or of the sympathetic system, or whether it is still more peripheral in its origin.

Filehne produced the chief symptoms in animals by section of the restiform body. Women are more frequently affected than men. Nervous diseases may be traced in the individual and in the family. A fright or worry is a frequent cause. Anæmia is common, but probably not causative. The symptoms may develop rapidly, but the rate of onset and of progress vary greatly; as a rule a slow onset and course obtain. The heart symptoms are generally the first, and palpitation may be most distressing. The proptosis and thyroid

enlargement are often more marked on one side, and usually the right. Organic disease of the heart may develop or be present before the other symptoms appear. Any of the cardinal symptoms may be absent. Cases have almost if not quite recovered, but this is rare; some improvement is not uncommon, rarely a rapid termination in death occurs.

The best treatment is perfect rest and plenty of belladonna. Every form of excitement should be avoided, and especially walking upstairs, which taxes the heart and circulation as much as violent emotions do. Arsenic and digitalis may prove of service, but iron even if there is anæmia often proves useless. A milk and vegetable diet is preferred.

HYPERTROPHY OF THE HEART.

Hypertrophy of the heart is not a disease in itself, being invariably secondary to other conditions, all of which are characterised by increasing the functional activity of this organ. Obstruction to the flow of blood is the main cause of increased functional activity, and the common diseases which cause this obstruction are chronic Bright's disease with arterio-capillary sclerosis, valvular lesions of the heart, and aneurysm of the aorta. Palpitation is set down as a cause, but this symptom, consisting in violent action of the heart making itself felt by the sufferer, is to be ascribed to an irritable weakness of the cardiac nervous centres, which explode unduly and too readily.

Although the sign of hypertrophy is a heaving impulse, yet this may be countervailed by a feeble action, by fatty degeneration, by emphysema, or by very fat chest walls. The apex beat is usually lowered, and may be displaced outwards, espe-

cially if the right ventricle is also hypertrophied. The weight of the heart may be enormously increased in hypertrophy, it may be two or more pounds instead of half a pound, and it may be three fists in size (*cor bovis*) instead of one.

Hypertrophy of the left ventricle is most common, and tends to increase the efficiency of the circulation if it exists alone, which is rare. It usually accompanies dilatation, and seldom causes symptoms unless (*see* Aortic Stenosis).

Hypertrophy of the right ventricle is most evident as epigastric pulsation and increased impulse just to the left of the lower part of the sternum.

DILATATION OF THE HEART.

Dilatation of the heart is usually accompanied by hypertrophy, when its physical signs are bulging of the heart region especially in children, lateral and vertical increase of cardiac dulness, diffuse and heaving impulse, prolonged muffled first sound when the hypertrophy overrides the dilatation, feeble first sound getting like the second sound in quality, when dilatation is most evident. The liver may be displaced downwards, and the left lower lobe of the lung may be compressed. The more hypertrophy, the stronger the pulse and the louder the second sound of the heart, the reverse obtains if dilatation is in excess, and the veins tend to get fuller, and the arteries more empty, so that the circulation is less efficient.

Pure dilatation of the myocardium may occur in acute diseases, or as the result of sudden effort, and sometimes from blood poisoning including tobacco and alcoholism. For further signs and diagnosis see Pericardial Effusion.

FATTY DEGENERATION OF THE HEART.

Any obstruction to the flow of blood through the heart, not only makes the heart muscle contract more vigorously, but also increases the demands on the circulation in the coronary arteries, and this excessive demand strains these vessels so that chronic changes are liable to be set up in them, causing thickening of their coats and atheromatous changes. Therefore it is easy to understand that such chronic coronaritis may interfere with the due supply of blood to the muscle of the heart with the usual consequences. The fatty degeneration thus induced, generally occurs in patches, so that looking at the heart, a variegated surface is seen, sometimes compared to maple wood or bird's eye tobacco because of the streaks, patches, and round areas of yellow colour and fatty nature.

The peri- and endarteritis of the coronary arteries may be so serious as to lead to actual occlusion of their lumina by thrombosis; ossification, or rather calcification of irregular distribution, is frequently felt in these arteries. Most of the morbid changes are best marked at the origin of the arteries from the sinuses of Valsalva, where their orifices may be seen to be much dilated and sometimes surrounded by a calcareous ring. The aorta itself is generally dilated, atheromatous, and may be calcified in patches.

The diagnosis of fatty degeneration of the heart is beset with difficulties, because a very slow feeble pulse, nervous exhaustion, and debility with attacks of faintness and giddiness, the symptoms being due to the feeble and irregular circulation of blood through the nervous centres, are symptoms of not much diagnostic value, seeing that a pulse may be slow, feeble, intermittent, and faintness

and giddiness with general and nervous debility may occur from disorder of the nervous centres alone or from altered states of blood. Moreover, a remarkably slow pulse is frequently not present in well-marked fatty degeneration of the heart. Weak impulse and sounds of the heart, attacks of asthma, may with equal acumen be ascribed to emphysema, and well-marked angina pectoris is so far common to other affections that its presence can hardly alone suffice to prove the existence of fatty degeneration of the heart. Still an opaque earthy tint of skin, associated with a fatty arcus senilis, a slow pulse, and attacks of dyspnœa and angina pectoris, does facilitate the diagnosis, but even this group of symptoms may be caused under some circumstances by chronic Bright's disease, and in well-marked cases of fatty degeneration of the muscle of the heart the cornea may be quite healthy. In fatty infiltration the oil is deposited in the connective tissues around, and between the muscular fibres, causing as a rule, but little interference with their functional activity. Obesity is always attended with this form of fatty growth which cannot be considered to be altogether harmless, for the experience of life insurance offices is that the expectation of life of stout people is, *ceteris paribus*, not so good as those of average weight.

Simple atrophy of the heart occurs in connection with exhausting diseases like phthisis, cancer, diabetes. Sometimes the atrophy is associated with pigmentation—brown atrophy—the pigment being deposited around the nucleus of each cardiac fibre. The treatment of these conditions is too obvious to need detailed consideration—healthy living and heart tonics sum it up.

OTHER MYOCARDIAL DISEASES.

Acute myocarditis may arise in acute rheumatism, and usually complicates endocardial and pericardial inflammations. Abscesses may form in pyæmia; if this be from bone disease, secondary abscesses are quite common in the myocardium.

Colonies of micrococci, with inflammation, sometimes suppuration, have been found in typhus fever and in other severe acute specifics.

Fibroid patches are well-known results of syphilis and possibly of alcohol; probably these begin as arteritis, and spread from the vascular changes. Other syphilomata and tubercles may be found.

In acute high fevers a form of cloudy swelling accounts for dilatation of the heart; diphtheria, Bright's disease, and scarlatina also, cause acute dilatation, the first and third perhaps from infective microphytes, the second from mere chemical poison; but probably fever, chemical and vital poisons may all operate together in any case. Chronic sclerotic myocarditis may arise by extension from valvulitis and pericarditis.

The signs of these affections are either too obvious to need mention, or too obscure to give a certain diagnosis. Sudden death may occur, as in the oft quoted case of the waggoner driving over London Bridge, in whom diffuse recent syphilitic tissue was found spreading through the septum ventriculorum and adjacent parts.

ENDOCARDITIS.

Often associated with pericarditis, acute inflammation of the endocardium and valves of the heart is of most common occurrence in acute rheumatism, especially during the juvenile and youthful periods

of life, adults after thirty being very much less prone to it. The symptoms, much less severe than those of pericarditis, are of much the same kind: precordial oppression, excited action of the heart with palpitation, shortness of breath, restlessness, anxiety.

The worst symptoms are probably due not to the mere endocarditis, but to the associated weakness and irritation of the heart muscle, and to the contaminated state of the blood; perhaps the syncope, cold sweats, orthopnœa, when they occur, should be ascribed to cardiac paralysis, and the great nervous irritation to the rheumatic poison. At least it is certain that when endocarditis arises in the course of acute rheumatism, it may give no signs of its development except the production of a murmur.

The left side of the heart is most affected after birth, whilst before birth the right side suffers most; nevertheless the right cavities do not always escape even in adult life; in puerperal fever to find vegetations on the tricuspid and pulmonary valves is a not very unusual occurrence. When acute endocarditis proves fatal, the failure of the heart muscle, either from simple paralysis or from myocarditis, is the cause. The remote effects of endocarditis are most to be dreaded, and embolism is a source of mischief.

Acute endocarditis is produced so frequently by true rheumatism, and so very rarely by other blood poisons, that in practice its existence amounts to proof positive of rheumatism, and that it may be the first term of the rheumatic series of events in children should be borne in mind. Other so-called rheumatic or rheumatoid affections are conspicuous by not producing endocarditis, and some even go so far as to say that they belie their name, since nothing can claim to be rheumatic which does not cause endocarditis.

The valves first become red and vascular, then a row of granulations forms at those parts of the valves where the cusps come in most accurate contact, and where therefore friction is greatest. These beads form on the auricular surface of the mitral and tricuspid valves, and on the ventricular aspect of the sigmoid valves, and therefore on surfaces exposed to the direction in which the blood flows. The inflammatory changes are of the usual kind, with exudation of small round cells; hence the valves become swollen and diminished in consistence, and the granulations have their base composed of small round cells, whilst on these there is deposited from the blood fibrinous concretions of varying size. In fatal chorea, and in very recent acute endocarditis, it is common to find only small bead-like granulations at the sites mentioned.

It is important to remember that true rheumatic manifestations are short lived, as witness the arthritis, rheumatic nodules, and erythemata; we may assume also that the granulations on the valves may recede and even disappear without a vestige of them remaining; but whether we should always attribute the temporary murmurs of chorea and acute rheumatism to them is a moot question, since we must admit the possibility of pure hæmic murmurs.

CHRONIC FIBROID VALVULITIS.

Chronic fibroid valvulitis may be as chronic and insidious as fibrosis or sclerosis of the liver or nervous system, or it may arise as the sequel of acute endocarditis. The evidence of necropsies is sufficient to establish its origin in alcoholism, and one of the common sights of the post-mortem room is a subject with fibroid atheromatous and calcareous

arteries, granular kidneys, gouty deposits in the joints and fibroid valves of the heart; and all this without hypertrophy of the heart or albuminuric retinitis, though these may be superadded.

Phosphate of lime and magnesia may be deposited in the valves of the heart in the same subjects. Such changes, though most common after middle life, may be seen in the young.

This sclerotic valvulitis does also originate from strain of the circulation due to excessive exertion.

ULCERATIVE ENDOCARDITIS.

Ulcerative endocarditis is a malignant form of endocarditis, probably due to infective micro-organisms, viz., staphylococcus pyogenes aureus and albus. The granulations are exuberant and bushy, with much fibrinous deposit; softening processes are evident in frequent rupture of valves and chordæ tendineæ; the microphytes are found in the valves and granulations; embolism is very common. The clinical course of such cases is very variable in duration, but usually very malignant; the disease must be regarded as an arterial pyæmia (Wilks). Both sides of the heart are more liable to be affected than in the benign form of endocarditis. It is quite remarkable that this ulcerative disease attacks by preference valves already damaged by chronic sclerosis.

The diagnosis is often difficult at first, since we have simply the signs of fever with—sometimes without—a cardiac murmur; but when signs of embolisms of the brain, kidneys, spleen, or arteries of the limbs appear, then to diagnose it from tuberculosis, typhoid fever, ague, &c., is very simple.

In any endocarditis a valvular vegetation may come in contact with the endocardium of the ven-

tricle, and set up at the part touched a similar inflammatory process; this is very evident in the malignant forms.

Aneurysms of the arteries of the brain and limb result from the infective emboli setting up infective endarteritis, which spreads through to the other coats of the artery.

In the chronic forms recovery may ensue, or the symptoms may subside for a time; in the more acute forms, simulating severe pyæmia, death is usual. Quinine and salicylates are the most serviceable medicines; the general and dietetic treatment must be of a supporting and stimulant sort.

CHRONIC VALVULAR LESIONS.

Chronic valvular lesions may arise from acute endocarditis, or may be chronic as before explained. However the valvular or ostial malformations arise, they may cause obstruction to the onward flow of blood, or may permit of regurgitation; hence we may have obstruction and regurgitation at any of the cardiac orifices.

The effects of the valvular disease on the muscle of the heart are chiefly seen in the alterations of the cavities and walls of the heart. Valvular diseases of all kinds may be clinically latent, the heart and circulation being competent to discharge all the ordinary functions of life; it is only when there is failure of adaptation that symptoms arise. Obstruction at any part of the heart causes hypertrophy of the muscle behind, as seen in the left ventricle in aortic obstruction, and in the left auricle in mitral stenosis. Physiology teaches that increasing the load which a muscle has to move increases the vigour of its contraction, and this goes on until the muscle is overloaded, when con-

traction becomes impossible. In aortic regurgitation the left ventricle is overdistended during each diastole, and this leads to hypertrophy so long as the heart muscle remains healthy (*see* Fatty degeneration of the heart).

MITRAL REGURGITATION.

A VERY common disease sometimes associated with mitral stenosis, and arising generally from acute rheumatic endocarditis, or from chronic valvulitis due to chronic renal disease.

Regurgitation may also be due to widening of the mitral orifice in dilatation of the left ventricle; fibroid valvulitis may spread from the posterior valve of the aorta into the large flap of the mitral valve, both structures being anatomically continuous. The valves may be thickened and rigid at their attached or free borders; puckering and calcification may occur; the tendinous cords may be thickened and shortened, preventing proper closure. In both stenosis and incompetency of the mitral orifice, the pulmonary circulation becomes overcharged with blood, the right heart, therefore, becomes hypertrophied and may be dilated, and the second sound over the pulmonary artery may be so loud that it may be felt as a snap; there is congestion of the lungs, especially of the left lower lobe; bronchitis, apoplexies, brown induration, or indurated pneumonia, are liable to arise, just as happens from any form of chronic congestion.

The greater the disturbance of the lung circulation, the more liability will there be to dyspnœa. If the right heart dilates, the tricuspid valve will in time leak, and the circulation will be greatly interfered with. Instead of having distended arteries and collapsing veins, we have just the reverse; hence mechanical congestion of the liver,

spleen, kidneys, and portal organs, with œdema of the extremities, and finally general anasarca. It is curious to observe, however, that the venous congestion may, as it were, select one organ and spend its force on that, so that in cases, not of the worst kind, the liver may be enlarged, or epistaxis or melæna or metrorrhagia may be the chief sign of the overdistension of the veins. If the blood tension in the aorta is much reduced, a scanty flow of water may be expected, and this will be high-coloured and may contain albumen and casts, the latter being sometimes bloody. However, even when the urine is scanty, albumen need not be present, because it seems some degree of pressure in the renal arteries is required before albumen can transude; and though experimental engorgement of the renal veins causes albuminuria, we do not yet understand the whole mechanism of albuminuria. Sometimes digestive disturbances are the chief troubles; much vomiting and retching may be attended with rejection of slime due to the chronic catarrh, or the symptoms may be merely flatulence, oppression and anorexia. Deficiency of circulation in the brain may be relieved partly by the sitting posture often assumed in bad cases; the irregularity of the circulation may lead to starting during sleep, and to disagreeable sensations and dreams; at times even distressing mental symptoms may occur, whilst headache and giddiness are common. The pulse is generally small, because the failing left ventricle throws less blood than it should into the aorta, and the pulse may be irregular in force and in rhythm; the state of the pulse is evidence rather of the state of nutrition of the heart muscle, and this again is dependent on the nervous centres of the heart and on the coronary circulation.

The number of symptoms and their character will be seen to be largely dependent on the heart

muscle, for it must be thoroughly understood that mitral regurgitation may be perfectly compensated, so that only a physical examination of the heart would reveal the presence of cardiac mischief; the compensation, too, may be effected with only *some* derangement of the circulation, and it is not uncommon for regurgitant cases to be perfectly well so long as no excitement or exertion has to be borne.

Heard best at the apex beat, conducted into the axilla even as far as the angle of the scapula, the mitral regurgitant murmur is systolic in time, high pitched in quality, and often a blowing or "bellows" sound.

In most respects the contrast with the murmur of **mitral stenosis** is very great, for this murmur is heard over but a limited area usually within the apex beat, is not conducted, is pre-systolic in time, low pitched in quality, and resembles churning and grinding sounds; moreover, a pre-systolic thrill running downwards to the apex, is common in stenosis, but very rare in mitral regurgitation. The thrill may be felt from the second left rib to the apex beat. Mitral stenosis is common during childhood and in young women; it sometimes has a curiously progressive course, increasing in spite of all care to avoid overworking the heart, and its very incidence is sometimes difficult to trace, being so insidious and apparently not to be accounted for by acute rheumatism; it may be congenital and is liable to be associated with tricuspid stenosis. A history of chorea is not uncommon. This form of valvular disease may be attended with such consequences as to give the patients a different aspect from those suffering from pure mitral regurgitation. Writing from the clear memory of several cases we may notice that the cyanosis is often very extreme, and yet the dropsy not so, whereas the belly may be full of

fluid, and the liver enlarged, often with other signs of portal obstruction than ascites. When pure mitral regurgitation is attended with much heart failure, the areolar tissues of the whole body get very œdematous, especially the lower extremities, and the blueness is accompanied with more pallor, being less blue-black than obtains in many stenotic cases; a large ascites with mitral stenosis may have but little fulness about the malleoli, and scarcely any pitting.

Sometimes mitral stenosis remains stationary for many years without producing cardiac failure. The mitral orifice may be contracted or its valves adhering along their free edges, may make a funnel shape with a slit like a *buttonhole* at the apex. The margins of the mitral ostium may be simply roughened, or warty growths may cause narrowing.

Aortic regurgitation is probably the most serious of any single valvular lesion; seldom arising during acute endocarditis, it is most often due to chronic changes, the result of over-strain and excessive tension in the aorta; probably it may occur acutely from sudden effort, rupturing either a healthy or already diseased valve; it may follow aortic stenosis. Thickening, puckering, adhesions and calcifications may be found.

Although mixed hypertrophy and dilatation of the left ventricle generally occur, compensation often fails much earlier than in mitral lesions and sudden syncope, even death, is more common. Underfilling of the arteries seems to make itself clinically most evident in brain symptoms: headache, giddiness and visual disturbances being perhaps as frequent as cough and shortness of breath. Moreover in chronic aortic cases, generally mixed stenosis and regurgitation, alarming fits of oppression about the chest with much gasping for breath, very liable to come on at night-time and

when the patient is falling off to sleep, are common. Also true anginal attacks are more frequent, perhaps because the coronary arteries are more liable to disease seeing that they arise from the aorta (*see* Fatty degeneration of the heart).

Dislocation downwards and outwards of the apex beat, increasing the vertical and lateral extent of the cardiac dulness, are respectively due to the hypertrophy and dilatation, and the impulse of the heart will be correspondingly heaving and diffuse. A sipping diastolic murmur may be heard best at the aortic cartilage, and is conducted usually down the sternum to the xiphoid cartilage; sometimes the murmur is best heard at the apex beat, especially it is said when the posterior valve is most affected; the best sign of aortic regurgitation is loss of the second sound at the aortic cartilage, but the loss is not invariable; auscultation of the carotid artery also reveals the regurgitant murmur, and the second sound may not be heard there as it should be. In all aortic cases the carotid artery should be auscultated. Rarely the murmur may be best heard over the pulmonary artery. A thrill of diastolic time is seldom present.

A jerking pulse, so-called water hammer, or Dominic Corrigan's pulse, merely signifies emptiness of the arteries, the elasticity of which is not brought fully into play, whence the obvious pulsation and excursion of the large vessels, the capillary pulse and the pulsation of the retinal vessels. The constant exposure of the aorta and great vessels to these hydraulic jets from a hypertrophied ventricle nearly always induces atheroma and fibroid changes in the arteries.

Aortic stenosis is the least harmful of all the valvular lesions, and is easily compensated by corresponding ventricular hypertrophy undiluted

with dilatation. It may last many years alone, but the large mitral flap may get thickened and puckered, and lead to mitral regurgitation, or the adherent and thickened aortic valves may get so puckered, or so ruptured, that aortic regurgitation is superadded. Symptoms are seldom present till the adaptation fails, but the face is apt to be pale and there may be headache due to hypertrophy.

When pure hypertrophy exists, the apex beat is merely displaced downwards with increased vertical extent of dulness. The murmur is best heard at the right base of the heart, and is conducted into the carotid and subclavian arteries; a thrill is more common than with regurgitation, and the pulse is small, rather prolonged, but regular.

Tricuspid regurgitation has already been shown to be due to dilatation of the right ventricle. The jugular veins may pulsate when there is no tricuspid leakage, the pulsation may then be due to simple communication from contiguous arteries or conceivably the vibration of a tightly stretched tricuspid valve may be registered in the jugular veins; the veins may pulsate from definite regurgitation (venous pulse), but it is certain that in many cases when the jugulars are distended, pulsate and fill from below that no other signs of tricuspid regurgitation, *i.e.*, no œdema, no enlargement of liver, no albuminuria, need obtain.

The systolic murmur of tricuspid regurgitation is most audible above the lowest part of the sternum, but in cases of heart disease with this lesion, an auscultatory puzzle exists, and the picking out of the tricuspid murmur is a point on which a difference of opinion may be allowed to exist.

Tricuspid stenosis is probably frequently congenital and associated with mitral stenosis, whose physical signs it simulates, a thrill running down

the sternum is often present; but the lesion is rather rare. **Pulmonary stenosis** is commonly of congenital origin and due to intra-uterine malformations or endocarditis; a loud rasping systolic murmur may be attended with a thrill over the pulmonary cartilage, and conducted up beneath the clavicle; such a murmur may be heard in contracting phthisis, perhaps from external constriction of the vessel.

The *diagnosis* of the situation and nature of valvular disease is sometimes absurdly easy, at others extremely difficult. As a rule, the whereabouts of the murmur indicates the orifice of its origin, but a mitral regurgitant murmur may be due to simple anæmia, to displacement of the heart by fluid pleural effusion or abdominal swellings, to simple ventricular dilatation in addition to the acute and chronic changes of the valves and its ostium. Take a case of acute rheumatism in which a mitral regurgitant murmur arises, is the bruit due to myocardial dilatation, to anæmia or to endocarditis? Evidence of dilatation in displacement outwards of the apex beat, in enfeeblement of the first sound, and weakening of the impulse, is no proof that the murmur is not due partly to the anæmia and partly to vegetations on the valve (*see* remarks on Causation, p. 3).

It is a good clinical habit to speak of real heart disease as distinguished from doubtful cases. When signs of hypertrophy exist, with a murmur having the characteristics of well-known lesions, we have real heart disease, and this is further established if there is knowledge that a cause of heart disease has been at work, such as rheumatism or Bright's disease. The value of previous history is well illustrated in cases brought to the doctor in a dying state; orthopnœa, dropsy, cyanosis and fainting, being the chief symptoms; a physical examination shows cardiac enlargement, chiefly

dilatation with lung engorgement, perhaps hydrothorax or the precordial physical signs may simulate pericardial effusion (*q.v.*). How then is the diagnosis to be made? Is it a case of common valvular disease of the heart with palsy of the myocardium, or is it a case of granular kidney, the hypertrophy of the heart and the great arterial tension having given out? Albuminuria will not help the diagnosis, no not even if fatty casts are present, and the quantity of urine is obviously no guide. Murmurs are not present because the heart is too feeble to produce them, or the effusions may smother them supposing that they were originally present. Albuminuric retinitis might help in the diagnosis, but chronic renal disease may never cause this change.

The loudness of a murmur is not of the least value in distinguishing functional from organic disease; some of the loudest murmurs ever heard are of functional sort, as for example, in the puerperal state (see paper by author in *Med. Chir. Trans.* for 1883). Too much reliance should not be placed on murmurs, either in diagnosis or prognosis. But a diastolic aortic, or mitral murmur is seldom if ever simulated by functional conditions.

The rarest of all murmurs is the pulmonary regurgitant, so rare that if heard most physicians would set it down to aortic regurgitation, but it does occur in slight and transient form in over distended conditions of the pulmonary artery from mitral or chronic lung disease, and in more permanent shape when that rare form, aneurysm of the pulmonary artery, occurs at the pulmonary orifice.

The prognosis is grave when the heart muscle shows signs of failure, when there is evidence of renal disease, or lung induration or bronchitis, and when the blood vessels are fibroid and

atheromatous. Embolism is a source of danger, especially in mitral stenosis; hæmoptysis is most common with mitral stenosis. Hard labour, poverty with its attendants, and anxiety, diminish the expectation of life.

Treatment.—Functional disorders are easily remedied by obvious means, if due to gastro-intestinal or uterine irritation. Hysterical palpitation is sometimes intractable. Bromides, cannabis indica, arsenic, and other nervine remedies, may be tried in pure neuroses, and the possibility of tea and other poisons being chief causes should be remembered.

In the treatment of chronic valvular disease we must attend to the state of the heart muscle.

Rest in bed or in a heart chair gives the heart least work to do, and enables it to overcome the forces opposed to it.

With a failing heart, and remembering that serious symptoms are always due to this, it would be folly to use aconite, even on the assumption that this drug was given to lower blood pressure and lessen the heart work. The blood pressure as a rule is already too low, and that is why the veins tend to become full and the arteries empty. Aconite can but weaken the heart still more, and even when hypertrophy is mixed with dilatation, it is questionable whether increased frequency of the heart's action, with a diminution of blood pressure, would render the circulation, relatively speaking of course, more efficient. Digitalis (and the like remedies) is the first and most important cardiac tonic, notwithstanding that it contracts the arterioles also. If the pulse is too frequent, feeble, small or irregular, digitalis should be used, no matter what the nature of the valvular lesion. Half drachm doses of the infusion, or five minims of the tincture, may be prescribed every three or four hours, and the effects carefully watched.

Liquor strychninæ in doses of a few minims is its most valuable adjuvant.

Digitalis may cause vomiting or diarrhœa, or may increase the serious symptoms, then other remedies should be tried.

Five minims of tincture of strophanthus, ten of convallaria. In many cases where these drugs do no good, simple ammonia and ether are valuable. Iron in large doses with saline purgatives, belladonna, and liquid extract of cinchona, with sal volatile, are worthy of mention.

For anginal and asthmatic paroxysms, nitrite of amyl, nitroglycerine, hypodermics of morphia, hot coffee, brandy and water, or any stimulant, should be remembered.

Distressing sensations may be relieved by local applications: fomentations, blisters, belladonna plasters.

If dropsy is not removed by cardiac tonics, diaphoretics, diuretics and watery purgatives, the malleoli may be incised and dressed antiseptically, the patient should be sat up in a heart chair; or Southey's tubes may be inserted. If sleep is not procured, chloral, sulphonal, paraldehyde, bromides, may be prescribed with some stimulant. The diet must be light and digestible (*see* Treatment of Indigestion).

PERICARDITIS.

Inflammation of the external fibro-serous covering of the heart is a local disease, occurring most frequently as the result of some special disorder of the system, generally rheumatism, scarlet fever, or Bright's disease.

It may proceed from pleurisy and pneumonia, apparently by simple extension of inflammation,

or may arise from the local irritation of tubercles or new growths. Any other form of blood poisoning may cause it, *e.g.*, pyæmia, variola, typhoid, puerperal fever.

The inflammation may cause simply hyperæmia and loss of polish of the surface from a little exudation of plastic lymph; more commonly, as in pleurisy, there is effusion of serum, the quantity varying from a few ounces to three pints or more. The parietal and visceral surfaces coated with lymph present a peculiar ribbed appearance, from the rubbing action of the heart; or shaggy processes may be seen, sometimes recalling the aspect of a cat's tongue. The layer of lymph in recent cases may be easily detached. In all respects pericarditis closely resembles pleurisy, and adhesions very commonly remain.

An *adherent pericardium* is frequently seen at post-mortem examinations; the sac of the pericardium may be completely obliterated or only at parts; the state of the muscle of the heart varies considerably. As the heart often has to work harder on account of the resistance to its action, hypertrophy, especially of the left ventricle, naturally ensues, and is combined with some dilatation, particularly in cases ending fatally. The fibrous tissue may spread into the myocardium, or it may spoil the circulation through the coronary arteries, and so give rise to fatty degeneration or atrophy of the heart muscle. Adhesions may cause no symptoms during life, or there may be the usual ones due to perverted cardiac action. The physical signs are not known with any certainty; a retraction of the præcordia may be seen during the systole; the apex beat may not move in deep inspiration as it should do, nor when the patient is rolled on to his left side; the epigastrium may recede during inspiration; a collapse of the distended jugular veins during diastole is another alleged sign, but

not one of the above signs are caused only by pericardial adhesions.

Milky white patches are common in the visceral pericardium, especially over the right ventricle, they result from the attrition of the heart against the pericardial sac, and are composed of fibrous tissue often laminated; by some regarded as fibromata, most believe them to be products of slight chronic inflammation.

The symptoms of acute pericarditis are severe pain, often referred to the epigastrium as well as to the præcordia, tenderness also in these situations, and irregular cardiac action, with or without palpitation. If the pericarditis happens to be the first local manifestation of rheumatism, as it often is, fever may set in suddenly, with shivering or its equivalent; but when occurring in the course of rheumatism these signs are sometimes smothered by those already present, whilst in Bright's disease it may be still more insidious, since fever may be absent, and uræmic manifestations clouding the intellect may mask the pain, or pericardial symptoms may be ascribed to the uræmia. Great frequency of pulse, often out of proportion to the temperature and to the breathing, and a curious tendency to delirium and mental disturbance are worthy of notice. Shortness of breath may be most evidenced in the patient's upright posture, or the patient's sensations of oppression may be the most striking evidence of dyspnœa. In some syncope, in some asphyxia, and in others nervous disturbance, may be the most threatening symptom, but in many cases of pericarditis, though there may be much suffering, there is not any immediate danger. Cough and vomiting are sometimes puzzling and distressing symptoms.

In the first stage of pericarditis friction sound about the base of the heart may be the only sign,

but palpation may detect tumultuous violent action, something like that felt in severe palpitation, and rarely friction fremitus. When effusion has occurred the percussion dulness is more extensive upwards, and may reach as high as the first space to the left of and beneath the sternum; downwards it may extend to the sixth rib or lower; its lateral extension is important, and the dulness may be noticed beyond the apex beat if this can be determined. Thus, a triangular area of dulness will be present, with its base at the diaphragm, and apex near the clavicle. Bulging of the præcordia, undulatory fluctuation of the fluid due to the heart's action, dislocation of the apex beat upwards into the fourth space and even outside the nipple line, with weakness of the impulse and deadening of the heart sounds, especially of the first sound at the apex, whilst the second may be well heard at the apex and base, are other signs to be looked for; but enlargement of the heart or an adherent pericardium may produce all these physical signs. Vocal fremitus is usually abolished over the distended pericardium, which may also lower the liver by its pressure; the spleen is also depressed in some cases.

As in pleurisy, with the absorption of the fluid, the dulness disappears from above and from the sides, whilst friction sounds often become more marked. If only friction sound is heard of cardiac rhythm, we cannot be sure that there is pericarditis, for plastic pleurisy may cause the same sign with pain, cough, and even palpitation. A dilated heart may extend the cardiac dulness laterally, weaken the first sound of the heart, cause an undulatory impulse, and the apex beat not being easily made out, the case may be thought to be fluid in the pericardium, and the difficulty is not lessened if there should be no fever, for albuminuric pericarditis may be afebrile, but in pericardial

effusion the first extension of percussion dulness occurs at the base of the heart and upwards; it is only in rare cases, however, that doubt does really exist. A question sometimes arises whether the physical signs are due to mediastinal abscess or tumours or to pericardial effusion, the last seldom causes pressure on the innominate veins or recurrent laryngeal nerves. It should be remembered also that pleurisy and pericardial effusion, or solid lung and pericardial effusion, may go together.

When the effusion is very great the physical signs may resemble those of pleuritic effusion. Mention may be made of a case of pyo-pericardium that occurred in University College Hospital, which during life was thought to be very solid lung with thickened pleura; explored with a syringe several times no pus could be withdrawn, the whole left side of the thorax was absolutely dull from top to bottom, the apex beat could not be localised, the heart seemed to be beating a little to the right of its usual position, but this could not be made out very clearly, the breath sounds were abolished except in the interscapular region, vocal fremitus was in abeyance. The intercostal spaces receded during inspiration, the left side did not move at all, there was much vomiting and delirium with variable fever. At the necropsy the pericardium was found distended to its utmost, the lung was reduced to a mere layer, being compressed between the pyo-pericardium and the parietes; the pus was most offensive; the liver fatty and large and depressed below its usual level.

Renal disease frequently causes acute pericarditis, acute pleurisy and acute pneumonia, and the heart muscle is often paralysed, if not inflamed, by the contaminated state of the blood, but acute endocarditis, common enough from

rheumatic toxæmia, must be a rare event in uræmia.

Pericarditis of uræmic origin is more to be feared than rheumatic pericarditis for its immediate danger.

The treatment of pericarditis should be that of its cause, with local application of hot fomentations or poultices, or perhaps one or two leeches if the pain is very severe. In uræmia or renal disease opium might increase a fatal tendency, in rheumatism it or a hypodermic of morphia may be employed with satisfaction. Stimulants may be necessary if the heart muscle shows signs of paralysis or if nervous prostration ensues.

In the removal of pericardial effusion, if blisters and iodides do not succeed, paracentesis should be resorted to; free drainage has been practised with success in cases of pyo-pericardium.

The site of puncture must vary in different cases; the fifth left interspace close to the sternum has frequently been the selected spot.

ANEURYSMS.

An aneurysm is a circumscribed tumour bounded by a sac containing blood and communicating with the lumen of an artery. A fusiform aneurysm is merely a dilatation of the whole circumference of an artery; aneurysmal dilatation refers to an enlargement of one side of the aorta, and is opposed to the term sacculated, which is applied to the ordinary aneurysm as above defined. Other terms used are described in surgical works, but are of no real importance. In most aneurysms the internal coat of the artery has long disappeared; the middle coat too tends to be destroyed, whilst the external coat becomes greatly over-

grown. Probably most aneurysms begin in an endarteritis, the anatomical results of which are seen in the flattened plaques projecting from the internal surface and constituting the first stage of atheroma. These plaques are composed of small round cells, and are situated in deeper layers of the intima, if they undergo fatty degeneration atheroma results, and calcification may also occur. Even when no aneurysm exists it is common to find the aorta dilated in irregular fashion, and with hard plaques, atheromatous and calcareous patches, and even atheromatous ulcers, due to the epithelium having given way. When an aneurysm forms the chronic inflammation spreads and involves the external coat, the periarteritis thus originating combines with the endarteritis to destroy the middle coat. In chronic aneurysms clots are generally seen lining the interior in laminated concentric fashion; the roughness of the interior and the slowness of the circulation in the aneurysm having led to the deposition of fibrin from the blood. In the cerebral and limb arteries aneurysms may arise from embolism, but probably only when the latter are capable of originating arteritis, simple chalky emboli do not appear to possess this power, nor does any non-infective arterial obstruction. Gout, lead, syphilis and alcohol are causes of aneurysm, as are also strain and overexertion, either by setting up endarteritis and periarteritis, or by actual tearing of the coats, or by both mechanisms combined. Aneurysm, especially abdominal, is rare in women, and this proves the efficacy of hard work to produce aneurysm, since men are its most frequent subjects. In soldiers, besides arterial strain, drink and syphilis are cooperative.

Symptoms. — Aneurysms of the conus arteriosus, and near this, cause the signs of aortic regurgitation — no more no less, and they never

attain any great size because they would rather burst into the pericardium and end fatally. Aneurysms of the first part of the ascending aorta do not cause many symptoms; some pain and a swelling, which may pulsate expansively about the second right space near the sternum and synchronously with the apex beat; a thrill may be felt. Unless the swelling give expansile pulsation we cannot be sure that it is an aneurysm, since an abscess or other retrosternal tumour may simulate mere pulsation; earlier felt than seen, pulsation may often be detected with the eye placed on the same plane as the pulsating area; even before the hand can appreciate pulsation, the ear placed on a stethoscope over the suspected area may detect an unmistakable jog. A systolic murmur may be heard, but a diastolic probably only when the aortic valves allow regurgitation. If the aneurysm interferes with the escape of blood from the aortic orifice, the heart may hypertrophy, but this is not common in aneurysms well away from the aortic ostium. The veins may be enlarged, with or without congestion and œdema; and a sibilus during inspiration and expiration generally implies pressure on a bronchus, which may be further evidenced in mucoid blood-stained sputa.

These aneurysms tend to grow through the ribs, and may form large swellings; it is astonishing how long such an aneurysm threatens to burst externally, often it never does, no matter how thin and red the skin may be.

Dulness on percussion, generally diminished vocal fremitus, and weakened breath sounds, are present over the aneurysmal area.

When the arch of the aorta is affected, important structures being involved, the clinical signs are more numerous and distressing; these are the cases most difficult to diagnose from solid or other tumours; the most frequent seat of their origin

is at the innominate artery. If the aneurysm develops behind the sternum it may, as in the ascending aorta, cause few symptoms, so that a pulsating swelling at the second left cartilage may be the first obvious sign.

Dyspnœa is certainly the most frequent symptom and is due either to pressure on the trachea or bronchus, or to paralysis of laryngeal muscles from implication of the recurrent laryngeal nerves. It may be a moot question whether mere involvment of the vagus nerves can produce attacks of dyspnœa by originating morbid afferent impulses, which travelling to the respiratory centres pervert their action. The recurrent laryngeal nerve being motor, its destruction causes the laryngeal muscles to waste, but curiously it is only the chief abductor, posterior cricothyroid, which is much wasted. The dyspnœa due to the implication of the nerves is always paroxysmal, the cough is usually metallic or croupy, though the voice need not be altered. The whole of the laryngeal muscles may be paralysed, even when only one recurrent nerve is destroyed, and then inspiratory laryngeal stridor accompanies the dyspnœa, which may be suffocative in character.

Destructive pneumonia is not unfrequent, and may be the effect either of occlusion of a bronchus, or of implication of the nerves—trophic pneumonia ; the physical signs resemble those of pleurisy, not ordinary pneumonia ; much fever usually attends.

The pressure on the pulmonary veins causes congestion and induration of the lung. In one case the upper part of the upper lobe of the left lung was congested and indurated ; the lower part looked like gray hepatisation ; the lowest lobe presented dilated bronchi full of puriform material.

Dysphagia and pain in spinal nerves, altered pupils and pulse, should also be looked for.

If the aneurysm involves the descending thoracic

aorta, the vertebræ and ribs may become eroded; severe "root" pains and even paraplegia may result from pressure on nerves or cord.

The treatment of aneurysm consists in getting the blood to clot within the tumour, chiefly by lessening the force of the circulation and increasing the tendency of the blood to coagulate. Absolute rest in a recumbent posture, with very low diet, is Tufnell's treatment. Ten ounces of solid food and eight of fluid is the total allowance. Sleep should be procured by bromides, and pain relieved by morphia. Large doses of iodide of potassium, rising to twenty or thirty grains, three times a day, sometimes effect wonderful results.

ABDOMINAL ANEURYSMS.

Aneurysms of the abdominal aorta are fairly common, but occur almost exclusively in men. Their causation is the same as those of thoracic aneurysm.

Most of them commence in the left hypochondrium, so high up that the application of a tourniquet on their proximal side is impossible; this site corresponds to the origin of the cœliac axis.

Since anæmic and dyspeptic individuals often present an aorta which pulsates unduly, and since over such pulsating aortas systolic (hæmic) murmurs are heard, care is required in diagnosis. Moreover, an aneurysm must present rhythmical expansive pulsation, and cannot be separated from the aorta by placing the patient in the hand and knee position; at least without these signs we cannot be sure of its nature. Auscultation should always be practised in the back as well as over the front of a suspicious swelling.

Sometimes awful pain, simulating sciatica or

lumbago, is the first clinical announcement of aneurysm. Vomiting, constipation, alteration of femoral pulses, hæmaturia, paraplegia, flexor spasm, wasting of testicle, and many other signs of pressure, should be looked for.

ARTERIAL DEGENERATIONS.

Besides atheroma, the arteries, especially the smaller more muscular ones, *e.g.*, radial and posterior tibial, may show calcification of the middle coat, and these may be felt as bead-like strings during life in gouty and old people. Primary fatty degeneration of the endothelial cells also occurs in any of the arteries, and generally in association with other changes; it is of but little importance. The internal coat of the arteries being extravascular is apt to suffer with other extravascular or poorly vascular tissues—cartilages, cornea, ligaments. Moreover, loss of elasticity of the lungs—emphysema—is also likely to be associated with inelasticity of the arteries, of the intestines, and of the skin, suggesting a widespread (congenital?) debility of elastic tissue.

Section VI.

DISEASES OF THE PERITONEUM.

PERITONITIS.

The peritoneum is a "huge areolar space or lymph sac, and its most intimate pathological relations are not with skin or mucous membrane, not even with joints or the so-called arachnoid

space, but with pleura, pericardium, and tunica vaginalis," all of which parts are embryologically parts of the great body cavity formed by the splitting of the mesoblast into somatopleure and splanchnopleure. "The diseases of these three divisions of the same original cavity are the same: acute inflammation, serous or purulent, traumatic or septic; chronic adhesive inflammation with hypertrophy; chronic irritative effusion and passive dropsical effusion, hydrothorax, hydropericardium and ascites. All three are liable to be invaded by tubercle and also by cancer. All three are prone to follow the pathological fate of the viscera which they cover; they are all apt to suffer in the course of Bright's disease, and lastly, they are often all affected together by inflammation, by tubercle, or more rarely by cancer." This philosophical and accurate clinical description is taken from the Second Edition of Fagge's *Medicine*, by Pye-Smith.

Rheumatism seldom or never affects the peritoneum as it does the pericardium and pleura, and peritonitis is seldom or never the result of cold, as pleurisy undoubtedly is. In men, the intestines and stomach, next the liver and gall bladder, and then the bladder; in women, the ovaries, Fallopian tubes and uterus, are the most frequent sources of peritonitis. Acute peritonitis is a frequently fatal disease, especially so when of perforative origin, the shock to the system causes considerable collapse, and this is seen in the anxious pinched features, sunken eyes, and dark areolæ. In severe cases paralysis of the belly muscles and of the intestinal smooth muscle gives three of the most important symptoms of peritonitis—want of movement of the belly during respiration, constipation and tympanites. Tenderness is usually, not always, present, and probably it is this symptom which causes the respiratory movements to be

absent, the legs to be drawn up, and any act voluntary or involuntary to be suppressed, for coughing, sneezing, straining, passing wind, are all painful; pressure may show exquisite tenderness, even the lightest touch being unbearable.

Fever, even as high as 105°, pulse wiry and incompressible, vomiting, dry red small tongue, obstinate hiccough, and dysuria, are other symptoms, none of which, however, need be present. The author recalls a case of purulent peritonitis in a child, in which vomiting once, temperature 101°, tympanites, were the only symptoms of peritonitis, and these might easily have been explained away, and were indeed, on the ground that the child was rickety and had bronchitis; the bowels were open once a day, and the stool was hard.

Causation.—Acute peritonitis is frequently the result either of perforation of some hollow viscus or of Bright's disease, chiefly of the large white kidney: perforation of the vermiform appendix, of the ileum in typhoid fever (and rarely of tubercular ulcer), of the stomach from ulceration, rupture of a bladder or ovarian cyst. New growths in the peritoneum may excite it. When the inflammation extends from the viscera to the serous coat it is apt to be more limited. Intestinal obstructions and herniæ are common causes, as also are suppurations about the pelvic organs in females.

Puerperal peritonitis is probably the result of sepsis, by direct extension from the diseased uterus. The evidence of acute peritonitis being due to other forms of blood poisoning and to cold is unsatisfactory. In children, and occasionally in adults, the peritoneum and other serous cavities have been the seats of purulent inflammation, only to be attributed to sewer gas poisoning.

In peritonitis the hyperæmia is apt to be present only in lines, where the intestinal coils are not in close contact with one another. Exudation of

serum and of fibrin, with pus cells, occurs in varying proportions, so that occasionally very large ascites is present, but generally a moderate amount of firm lymph glues the bowels together, and less often the serous coat is lined with a greasy looking pus, and some pus is present in the peritoneal space. Sometimes there is spotty blood extravasation. Peritonitis may be circumscribed when it results from disease or perforation of a viscus; the symptoms are much the same, but less severe, and a termination may be favourable by way of an abscess, which may open outwards on to the skin or into the bowel, or may simulate abscess of another origin in the same region. The diagnosis of acute perforative peritonitis is often beset with difficulties, since colic is a severe symptom, and is a common one of many belly affections. The tenderness of peritonitis has been mistaken for the hyperæsthesia of hysteria, and *vice versâ*. Sudden severe pain in the belly and collapse may be due also to bursting of an aneurysm, or to hæmorrhage from the Fallopian tubes. Peritonitis, like pericarditis, supervening in the course of another disease, is apt to be masked, and only found out at the necropsy, as in Bright's disease, and even in typhoid fever and also in diabetes.

The *treatment* of acute peritonitis depends on its cause; if due to perforation of the stomach nothing should be given by the mouth, rectal enemata being the proper method of feeding and relieving the thirst. Opium in full doses and absolute rest in bed. These instructions apply to all cases except the latent forms, which generally not being recognised need no treatment. Purgatives must never be used because we cannot be sure that the bowel is not perforated. Pain and vomiting may be relieved by the usual means. A cradle to keep the clothes off the belly, and a feather pillow under the knees are very useful practical points.

The diet must be liquid and light (*see* Typhoid Fever). Ice pills in moderation, and syringing out the mouth with an acid or bitter solution, give comfort and relieve the thirst. The tolerance for opium is simply astonishing, a half grain may be given at once to a boy, especially in perforation of the appendix, and this dose may be repeated until a full contraction of the pupils obtains.

Besides *tubercular* and *cancerous* peritonitis, there is a *simple* form of obscure origin and not very rare occurrence, in which the intestines and the other viscera may have a thick coat of fibrous tissue; ascites is the most prominent association, and this may be loculated and cause difficulties in the diagnosis from ovarian cyst. This form of peritoneal thickening or coating may occur at any age and in either sex. Alcohol, syphilis, gout, lead, kidney disease, and heart disease, have been noted in connection with it, but sometimes no cause is apparent. The intestines are not always adherent, the mesentery may be much shortened, also the bowels, and they may be contracted in calibre. Discomfort, pains of colicky sort, loss of strength, flesh, and anæmia, with irregular action of the bowels, are common symptoms. Ascites should be relieved by diuretics or tapping; syrup of iodide of iron appears to do some good.

ASCITES.

This means any fluid free to move in the peritoneal cavity, and its diagnosis is generally not difficult. As the fluid gravitates for the most part, when lying down the flanks will be dull and the front of the belly resonant, or the highest parts will be resonant in any position; so when the patient lies on one side the dulness of the flank may be made

to disappear and reappear by changing the position of the patient. Moreover, a fluid thrill may be detected from fluctuation of the fluid by flipping one part with a finger, and feeling over another part with the palmar surface of the fingers of the other hand; it is usual to place a cardboard edgewise between the percussing finger and the palpating hand, to prevent the passage of the wave due to the movement of the belly wall.

The fluid may be straw or greenish coloured, and quite clear or slightly turbid or even purulent; it may contain altered or fresh blood; it is highly albuminous, and has a density of about 1018, and an alkaline reaction to litmus paper. If present in large amount it may distend the whole abdomen, but in the recumbent posture the flanks are most convex and distended; the navel in ascites may be either stretched transversely, flattened out, obliterated, or even pouched outwards, and fluid may occupy this pouch. The skin may become tense and shining from slight œdema; the superficial veins may enlarge; dropsy and even purpura of the legs may occur from pressure on the vena cava inferior; the heart's apex beat is often dislocated upwards and outwards, but a pressure murmur over the heart is not common. The distension may lead to lineæ atrophicæ vel albicantes. Ascites without anasarca is common from hepatic cirrhosis, and may occur also in mitral stenosis; simple tubercular and carcinomatous disease of the peritoneum may cause it, also any of the forms of chronic hepatic atrophy or pressure on the portal vein in the hilus of the liver from a large gland or rarely from hepatic abscess or cancer.

It is common as part of general dropsy in Bright's disease, heart disease, and chronic lung disease.

The differential diagnosis is sometimes difficult because the fluid thrill cannot always be obtained

even when there is much fluid and when there is very little; the percussion note may be dull in front then ascites simulates an ovarian cyst, a pregnant uterus, or a distended bladder. In children often, and in adults sometimes, ascites is diagnosed when there is nothing but a tympanitic belly in the former, and obesity with some tympanites in the latter. The depressed state of the navel in obesity is a guide. Sometimes a hydronephrotic or hydatid cyst resembles in physical signs a large ascites. In some immense ascites the mesentery has become shortened from chronic peritonitis, and the intestine cannot reach the surface of the belly, therefore dulness on percussion everywhere prevails. If an ovarian cyst contains air, as it may do after tapping or from a communication being established with the gut, resonance may be got on percussion over it. Measurements should be made of the belly circumference and other local parts, but in a difficult case are of practically no value. The history often aids in diagnosis, since an ovarian cyst begins to grow low down and from one side, or a renal cyst from one side in the loin. The bladder should always be emptied by a catheter.

In pregnancy other signs of gestation should be sought for. In ovarian cyst the largest measurement is below the umbilicus, not at it as it is in ascites, the measurement from pubes to umbilicus is increased, so that the navel may be equidistant from the xiphoid cartilage and the pubes; the upper border of the cyst may be seen and felt, especially on taking a deep inspiration.

Sometimes a puncture has to be made and fluid withdrawn before a diagnosis is attained, and further, ascites may complicate ovarian cyst. Ovarian fluid is often viscid and of dark brownish colour; the viscidity is believed to be due to paralbumin, which does not coagulate by boiling and

acetic acid; fibrin is not present. Ascitic fluid generally contains fibrin but not paralbumin; but none of these signs is absolute, for ovarian and ascitic fluids are sometimes indistinguishable both chemically and physically. Parovarian fluid, like hydatid fluid, contains no albumen, and is of very light density. In ascites complicating cancer of the stomach, omentum, or ovary, the fluid withdrawn may be dirty brown in colour, or even sanguinolent, and in colloid cancer viscid glue-like stuff may be withdrawn (or the patient may pass it by the bowel). Ascites may be milky from admixture of chyle due to rupture of lacteals. In hepatic ascites and in ascites from chronic peritonitis, the fluid is either greenish or straw coloured and limpid.

Treatment of ascites, which is usually of serious prognosis, is not very satisfactory. Of diuretics, the resin of copaiba in almond mixture is good, and the dropsy pill, composed of one grain each of blue pill, powdered digitalis and squill, is often remarkably efficacious; compound jalap powder is about the best watery purge. But in most cases paracentesis often repeated has to be practised, if not to relieve the dyspnœa, at least as the only way of removing the fluid. The treatment of ascites from heart and kidney disease is the treatment of those affections.

SECTION VII.

DISEASES OF THE STOMACH.

ACUTE GASTRIC CATARRH.

IN health we are not conscious of the existence of a stomach or a heart or a liver, a morbid sensation may remind us of their presence, and this may be of the slightest or of the most severe degree. Dyspepsia is a cloak for our ignorance, usually applied to a set of symptoms supposed to indicate only trifling derangement of the stomach. But we should never diagnose dyspepsia first, as we should never diagnose hysteria or neurasthenia, without being quite sure of the absence of organic disease; in some cases the diagnosis should hang in the balance.

A "bilious attack" may be due to acute dyspepsia, or may be the expression of a central disorder—a megrim; any prolonged or violent vomiting may cause rejection of bile, which gets into the stomach by "antiperistaltic" movements of the duodenum.

Acute dyspepsia may be excited by an undue quantity or an irritative quality of the food, perhaps combined with nervous excitement, especially in children, or with the taking a chill in adults. A feeling of illness, with headache, giddiness, thirst, nausea and vomiting, may be the grouping of symptoms. It may terminate in a day or may continue for several days, when the attack is generally called acute gastric catarrh. If the digestive functions of the stomach are simply suspended for a time, and then vomiting relieves the stomach of its load, we call the case one of acute dyspepsia; we suppose that the shock to

the stomach has not set up inflammation, and the proof of that is the speedy recovery.

Uncomfortable sensations or actual pain, epigastric tenderness, thirst, anorexia, sour breath, foul tongue, coated with remarkably thick yellowish fur, nausea, retching, acid eructations, and possibly slime in the very acid vomit, are common symptoms, but the degree and combination of them vary in different cases.

Slight or more marked melancholia, malaise, and aching in the trunk and limbs, may be noticed, the skin is usually rather clammy, and the pulse soft; the temperature about 100°, may be much higher in children. Occasionally chills at the onset and herpes labialis may suggest severer mischief *e.g.*, pneumonia. The urine is apt to be scanty and high coloured, probably from a curious retention of water in the system, which is not altogether to be accounted for by the degree of fever, and suggests that some dilatation of the stomach may be present, though in the case of Alexis St. Martin Dr. Beaumont noticed, through the gastric fistula, that fluids were rapidly absorbed, whilst solids remained undigested. Although absorption is active, secretion and digestion are in abeyance, and probably even without dilatation there may be impairment of the natural churning movements of the stomach.

The observations of Dr. Beaumont tend to show that the mucous membrane of the stomach may present lesions altogether comparable to those found in the mucous membrane of the mouth—patchy hyperæmia, vesicles looking like aphthæ, pimples filled with purulent matter, and excoriations leaving the papillæ bare. Some grounds also exist for believing that in ulcerative stomatitis a similar morbid process may exist in the stomach; one often sees the little ulcers on the soft palate and even on the back wall of the pharynx. Hæ-

morrhages, swelling of the mucous membrane, and excessive secretion of mucus may also be seen.

After death from acute specific fevers, especially variola and scarlatina, the mucous membrane is found swollen, opaque and friable, with desquamation of epithelia in the tubules, and infiltration of leucocytes into the interstitial tissue. Casts of the gastric tubules, very like epithelial urinary casts, have been found in the vomit and contents of the stomach. The solitary follicles may be swollen and may ulcerate.

Still more acute forms of gastritis may be due to irritant poisoning, in which the symptoms are greater collapse, with cold sweating surface, and more feeble frequent pulse; arsenic, antimony, mercury, poisonous fungi and berries, and decomposing foods, are the chief of such irritants.

In the post-mortem room the stomach is often found lined with slime, remarkably red, and hæmorrhagic, in cases of cirrhosis of the liver and heart disease and acute alcoholism.

Membranous gastritis has been seen in phthisis, Bright's disease, and in diphtheria, sometimes associated with similar formations in the intestines.

As very rare affections, might be mentioned, acute paralytic distension of the stomach, diffuse and phlegmonous suppuration.

In the diagnosis of acute gastric affections the possibility of the sickness and furred tongue being due to typhlitis, to an acute specific fever, or to typhoid fever, should ever be present.

Treatment consists in administering an emetic and a sharp purge of three or more grains of calomel, with a scruple of compound jalap powder; neither should be repeated, and even the latter may be harmful if the diagnosis is uncertain. It is one of the saddest examples of the evil effects of popular medicine, when large doses of castor oil are indiscriminately prescribed in cases of

abdominal pain. The symptoms being umbilical pain, vomiting and constipation, do simulate those of gastric and peritoneal inflammation, and too much care in diagnosis cannot be exercised. Abstinence from food for twenty-four hours, soda water to drink, and ice to suck, are good rules of treatment. Milk should not be prescribed unless it has been boiled, skimmed and guarded with barley or rice water, or made alkaline with lime water or bicarbonate of soda, for the simple reason that the resulting curds can do nothing but irritate the stomach. This rule has most application in infancy.

Cold wet compresses or hot fomentations or spongiopiline, may be applied to the abdomen.

Farinaceous foods should be given before meat and eggs are allowed, since the latter are most digested in the stomach, the former in the intestine.

Ten grains of bismuth subnitrate, three drops of dilute prussic acid, with a dram of mucilage, and a few drops of solution of muriate of morphia, in a mixture, is a useful prescription. The bitter infusions are not useful in acute gastric catarrh. If convalescence should prove tardy, a change of air and a strychnine tonic may be ordered.

HÆMATEMESIS.

Hæmatemesis of any constancy or severity mostly occurs only in organic diseases of the stomach and liver.

Since coughing and expectoration may excite vomiting, and conversely vomiting with rejection of the contents of the stomach may excite coughing, we cannot always relie on the patient's statements in differentiating hæmoptysis from hæmatemesis. As a rule the blood in hæmatemesis is dark or coffee

coloured and acid, whereas in hæmoptysis it is bright red, frothy and alkaline. Melæna is generally noticed after hæmatemesis; in hæmoptysis the sputa may be discoloured with blood for days after. Since the reflex act of coughing is more easily excited by hæmoptysis than is vomiting by hæmatemesis, the outward signs of a severe hæmorrhage are more evident in the former; the inward signs—fainting, loss of sight, etc., in the latter; indeed, in hæmatemesis, melæna may be the only external passage of blood.

Of course blood may be intentionally swallowed by swindlers or may have come from the lungs, nose, mouth, throat or gullet.

Gastric juice decomposes hæmoglobin and produces hæmatin, and to this substance is due the "coffee grounds" of a small hæmatemesis, and the tarry, black-pudding appearance of a larger hæmatemesis.

Changes in the blood (*see* Purpura); changes in blood pressure, as in Bright's disease, over-fulness of the veins as in cardiac disease and cirrhosis of the liver; gastric arterial disease as in aneurysm, atheroma and chronic Bright's disease; ulcer and cancer of the stomach, are the chief sources of true hæmatemesis; an aneurysm of the aorta very rarely bursts into the stomach. The hæmorrhage is seldom great or fatal in cancer, and roughly speaking, an ulcer or cirrhosis of the liver are the commonest causes of severe—and often fatal—hæmatemesis.

Of severe hæmatemesis the correct treatment is absolute rest in a cool bed, without any drugs, unless a simple sedative to the nervous system. If due to portal congestion the hæmatemesis will relieve this; if due to ulcer of the stomach—in some cases a diagnosis between the two diseases is impossible—then astringents may be used. Reasons exist for believing that even an ulcerated

artery stops bleeding, rather by syncope and increased hyperinosis of the blood, than by any contraction on its part, repeated hæmorrhages being prone to occur; the orifice in the artery is generally rigidly patent as the result of the cicatrising processes in the ulcer. Tufnell's treatment of aneurysm—starvation and absolute rest—is far more efficacious in the treatment of hæmatemesis, than is any quantity of turpentine, gallic acid, or lead acetate. Opium is useful.

FUNCTIONAL DERANGEMENTS.

Certain symptoms may occur alone and independently of organic disease of the stomach. Pains of various character are common: gastralgia, gastrodynia, cardialgia, do not appear to have any very definite meaning. Pain being the only symptom may come on when the stomach is empty, immediately after or not till from two to four hours after a meal. Females of hysterical type, neurastheniacs, and those who lead enervating lives often suffer. Other causes, such as gout, rheumatism and alcoholism, probably do not simply cause pain, but disturb also the functions of the stomach. *Gastrodynia* is generally limited to pains presumed to be due to colic from spasm of the stomach walls; it might be attended with a slow pulse, a cold surface and faintness; probably some of the cases are masked epilepsies. Flatulence or undigested food often excites it.

When pain is due to functional disorder, food does not aggravate it, nor does vomiting relieve it, whilst firm pressure on the epigastrium may alleviate it, in all these respects it differs from pain due to organic disease; but this is only approximately true.

When pain is referred to the stomach, the disease is not always situated in that viscus; nor when there is epigastric tenderness and rigidity of the rectus and oblique muscles is there necessarily only myalgia, for myalgia and neuralgia may be due to gastric disease and to irritation of the spinal dorsal nerves; in children a "belly-ache" often first announces spinal caries, and in adult men a stomachache may first warn us of the presence of an aneurysm.

Pain may be combined with vomiting without there being organic disease, as in hysteria and neurasthenia.

Appetite may be excessive—bulimia; large quantities of food may be eaten—polyphagia; or any rubbish may be swallowed—pica; probably in all these cases there is hyper- or anæsthesia of the gastric mucosa.

Nothing seems clearer from the observations on Alexis St. Martin, than that food may remain in the stomach undigested for even two days. Given this, the explanation of flatulence with gaseous distension, chiefly from carbonic acid, does not seem difficult, since abnormal fermentations would of course occur; sometimes marsh gas and sulphuretted hydrogen are also evolved.

Pyrosis or waterbrash may in some individuals be the only symptom, and reminds one of the act of rumination; probably the fluid regurgitated into the mouth is swallowed saliva, since it frequently is perfectly tasteless; when acid we may assume some admixture of gastric juice, but some maintain that the rejected fluid always comes from the stomach, because it possesses peptonising properties.

Heartburn or *cardialgia* is a burning sensation commencing at the epigastrium and passing upwards apparently along the gullet, it may be attended with an acrid waterbrash, or may exist

alone as a neurosis, it is common without other symptoms in epileptics and neurastheniacs.

Vomiting may be a pure neurosis unattended by other symptoms either of brain or gastric disease. Constipation generally attends it. Seldom excited by spinal disease, it may be the most prominent symptom of coarse brain disease, of Addison's disease, or of Bright's disease, with the last being often associated with diarrhœa.

Vomiting is a common symptom of intestinal obstruction or peritoneal disease, and may accompany any of the colics—renal, intestinal or biliary.

It is common at the onset of acute fevers and some inflammations, *e.g.*, pneumonia, pericarditis.

Although as a rule in gastric vomiting the tongue is furred and nausea is felt, yet when there are both these symptoms we cannot be sure that the state of the stomach is the cause of the vomiting, for they may both be present when the obvious disease is outside the stomach, and it is certain that centric and reflex vomiting from other organs are more prone to occur when the stomach is itself not healthy. In some brain tumours the vomiting, headache and giddiness, may come together and depart together, so that the relief from giddiness and headache, after vomiting has ceased, is not a certain proof that all three symptoms were due to gastric irritation. It is equally true that a slow pulse may be due to gastric and to brain irritation, and may occur only at those times when other symptoms are present. Caution is therefore needed before we can conclude that the presence of nausea and of a furred tongue shows that the stomach was the offending viscus. Again, in undoubted cancer of the stomach, the tongue may be clean from first to last, and the nausea and vomiting only attend the pain.

Hiccough or *singultus* is a common symptom of indigestion, especially in infants; it is of grave

significance in peritonitis and other prostrating diseases; it may be incessant and very obstinate in hepatic diseases, *e.g.*, impaction of gall stones and abscess. It is due to sudden action of the diaphragm, the air being drawn suddenly through the glottis, which is perhaps also slightly closed by spasm.

INDIGESTION.

Dyspepsia is a chronic disorder, sometimes principally due to general or nervous debility, but more often to simple ill treatment of the stomach.

In atonic dyspepsia the distressing sensations, either epigastric, sternal, or between the shoulders, are unattended by tenderness, and pressure usually affords relief. Much liquids, especially soups, and tea drinking aggravate the distress and produce flatulence with its colic—gastrodynia. Gaseous eructations and vomiting often occur. Thirst is usually wanting. The tongue is pale, flabby, tooth indented, and may be clean. The bowels are usually constipated, and there may be colic from flatulent distension of the colon. The general symptoms are those of lack of power, and melancholia, with a soft pulse easily quickened by movement. Polyuria and a tendency to alkalinity of the pale urine are frequent, and point to the atony being the result of irritable weak nerves, as do also the retention of the fat and want of anæmia; for though the patient look pale the blood may be of normal quality and quantity.

In irritative dyspepsia or chronic gastric catarrh, whose principal cause is the abuse of stimulants and food, the symptoms are, in a typical case, just the reverse of those of the atonic form. In cases of cancer and ulcer of the stomach, improvement of the

gastric symptoms by treatment is often effected, and this must be due in most cases to the cure of the chronic catarrh, which almost invariably accompanies such organic disease. Chronic gastric catarrh, due to alcohol, may be associated with hepatic cirrhosis, and may lead to sclerosis of the coats of the stomach. There is always a lining of slime, and much vascularity of the coats of the stomach, all of which are thickened, but especially the submucosa, in which considerable interstitial overgrowth takes place, leading to the destruction of the gland tubules and to the formation of cysts, just as in the case of interstitial nephritis. The inner surface of the stomach may become hob-nailed, *état mammelonné*, just as the liver and the kidney become granular, showing elevations and depressions, the whole process of chronic interstitial overgrowth producing results as identical as the difference in structure of the different organs will allow.

The tongue has usually a remarkably thick yellowish fur with red tip and borders; thirst, tenderness and acidity are present; the urine is scanty, high coloured, and generally deposits pink lithates; there may be diarrhœa alternately with constipation. In alcoholic gastritis the throat and fauces are often much injected also. It is frequently difficult to separate atonic from irritative dyspepsia, because the symptoms are mixed in the same case. The most important part of the treatment is dietetic.

New bread, pork, veal, salt and preserved food, potatoes, vegetables, pastry, sweets, cheese, nuts and pickles, are generally indigestible.

Beer and stimulants, strong or impure tea and coffee, may often be relinquished with advantage. Avoidance of mental or bodily exercise just before and just after a meal; plenty of fresh air, exercise and woollen clothing, and free ablutions of the

skin, undoubtedly tend to relieve indigestion. Drink should be sparingly used at meal times.

In chronic gastric catarrh a mixture composed of ten grains of bismuth trisnitrate, held in suspension by mucilage, ten of bicarbonate of potash, five minims of tincture of belladonna, and a little chloroform water, often does wonders. And generally alkalies do most good in irritative, acids in atonic dyspepsia. Oxide of zinc and of silver, alum, tannin and matico, are also prescribed.

In atonic dyspepsia a little wine or weak spirit and water should be allowed with the meals, especially if there is a tendency to cold hands and feet. Anything which causes flushing of the face should be avoided.

A practitioner brought a young woman suffering from severe dyspepsia, and said he had tried every thing in the pharmacopœia and all kinds of diet; the patient was obviously anæmic, and soon improved on perchloride of iron and Friedrichshall water.

GASTRIC ULCER.

Severe singular pain, vomiting and nausea, with hæmatemesis, are the cardinal symptoms of gastric ulcer, but these may be present in chronic gastritis, cancer of the stomach, and cirrhosis of the liver.

There are two kinds of ulcers, the perforating and the chronic or indurated.

Causation.—Females between puberty and thirty yield the largest number of perforating ulcers. Old men have the chronic kind most frequently. Anæmia, menstrual disorders, and phthisis in the young, alcohol and nervous exhaustion in the old, are the chief associations. Any cause which impairs the nutrition of the gastric mucous mem-

brane, is a pathological cause of ulceration; hæmorrhage, thrombosis or embolism, are potent vascular causes; chronic gastritis and submucous suppuration may be the starting agencies. The gastric juice can digest the mucous membrane when its vitality is lowered. Perhaps perforating ulcers may originate from impaired innervation, like those of the foot in tabes dorsalis.

The perforating ulcer has a round or oval outline with sharp cut edges; it is conical in shape, being widest at the mucous membrane; the base is narrowest, and often composed only of thin subperitoneal or peritoneal tissue, coated with blood or sloughy tissue. They are most frequent near the pylorus, near the lesser curvature, and on the posterior wall of the stomach. Hæmorrhage from ulceration of arteries or veins may occur, or the base may become adherent to subjacent organs. Perforation is frequently fatal from shock and peritonitis. The ulcers often cicatrise, and may pucker the parts around.

Symptoms.—The seat of pain can often be covered with the tip of the forefinger; the pain shoots through to the back and may be similarly limited there. The pain is said to vary with the position of the ulcer, being directly over it; also food causes pain, and the interval between the food and the pain is said to be greater the further the ulcer is away from the cardiac orifice. The pain is called xiphoido-vertebral by the French. Vomiting relieves it. Hæmatemesis may be very copious and is a common symptom; melæna may alone occur; constipation is the rule. In middle aged women and old men there is much appearance of anxiety and loss of flesh, and it is difficult to exclude cancer. Young women often have only the signs of dyspepsia, but emaciation need not be present. The ulcer may give no obvious evidence of its existence until perforation occur.

The *diagnosis* may be easy or difficult, as will be gathered from what has been said above.

Treatment.—If there be no doubt of the diagnosis it is best to keep the patient in bed, so as to prevent expenditure and lessen the demand for food. Iced milk or broths may be allowed in strict moderation. Rectal nutrient enemata and suppositories of peptones should be employed systematically. This may be kept up a week or so. Then small quantities of liquid food, cold or iced, may be given by the mouth. Pain may be relieved by injections of morphia or cocaine, or these may be given by the mouth; a blister over the epigastrium is often very useful to check vomiting and pain. Vomiting may be controlled by bismuth, hydrocyanic acid, creasote or effervescing drinks. The bowels should be kept open by saline purgatives, but not if there be grave signs, such as hæmatemesis or very severe pain; then enemata are best. Opium or morphia is the most valuable medicine when there is hæmatemesis, severe pain or severe vomiting. Other hæmostatics are turpentine, ice, ergot, gallic acid, hamamelis. Cod-liver oil and steel wine may round off the treatment.

CANCER OF THE STOMACH.

A COMMON disease often hereditary, and most frequent in males, generally occurring after forty years of age. It may affect the pylorus or the body of the stomach, when at the cardia it probably always commences in the œsophagus. As elsewhere in the alimentary tube, it tends to surround the canal, and may thus easily cause an annular pyloric stricture; but rarely does it cause an hour-glass constriction of the stomach itself.

Scirrhus is the most frequent primary cancer of the stomach, but encephaloid may be seen; caseous and colloid degeneration are met with not unfrequently. The whole of the coats are thickened, but chiefly the submucosa, and a great tendency exists to the contraction of adhesions with surrounding organs, especially the under surface of the liver. Probably owing to the short duration of the cases, secondary growths are not very common.

Cancer probably always begins in the gastric glands, not in the submucosa, though it flourishes there most. Pyloric stenosis may also be due to the contraction of a simple ulcer. Even when pyloric obstruction exists, dilatation and hypertrophy of the stomach need not follow, for vomiting or anorexia may prevent it. The hardening and contraction of the scirrhus growth may considerably alter the shape and diminish the size of the stomach. Commonly dyspepsia is diagnosed at the outset, but the age of the patient and rapid loss of flesh suggest cancer and chronic ulcer; the difficulty in diagnosis is often for a time great, since both may improve under treatment, owing partly to the subsidence of the accompanying catarrh and partly to better dieting. If a tumour can be discovered, the chances are great that the disease is carcinoma, but some induration may be rarely felt when there is an ulcer, and often in carcinoma no definite tumour can be felt. Pain, tenderness, vomiting, and hæmatemesis, are common to both, and to hepatic cirrhosis—see these diseases. The pyloric cancer generally presents its tumour a little above and to the right of the umbilicus, the pylorus being dragged down from its usual situation, and it may pulsate as it lies over the aorta; it may be found much lower in the belly than this. If the stomach is dilated this may be ascertained by its percussion note

being below the level of the umbilicus, and sometimes by visible peristalsis in its thickened walls, by splashing sounds heard on succussion of the abdomen, by hollowing of the epigastrium and left hypochondrium, with prominence of the lower parts of the abdomen. The œsophageal tube used to empty the stomach may determine its lowermost limits, and a dose of carbonate of soda and citric acid may facilitate the recognition of dilatation by distending the stomach with carbonic acid. When dilatation exists the vomiting becomes peculiar, large quantities being rejected, but only at long intervals, generally a day or two; the vomit is usually intensely acid and frothy, torulæ float on its surface and sarcinæ fall to the bottom of the vessel containing it. The former are the oval cells of the yeast plant, the latter are rectangular bodies divided into smaller rectangles by cross lines. The best treatment for gastric dilatation is the stomach siphon; the patient swallows a soft flexible india-rubber tube whilst he reclines in bed; the other end of the tube is provided with a funnel, by lowering this below the stomach level the organ can be emptied, by raising it and pouring in water the stomach can be filled and so washed out; after cleansing, a medicated solution of a drachm to the pint of bicarbonate of soda or alum may be used to improve the state of the mucous membrane; the temperature of the solution should be about 98° F.

The other treatment should be as for severe dyspepsia; nutrient suppositories may be used in addition to other nourishment.

Hysterical women may swallow masses of hair and string, thus producing gastric concretions.

Section VIII.

DISEASES OF THE INTESTINES.

COLIC.

This is a form of spasm of the intestines. Often of agonising severity, it may, like the other colics, cause faintness, sweating, and vomiting. The belly walls are usually retracted, very hard and knotty, owing to the contraction of muscles, and the pain is referred, as usual in belly complaints, to the umbilicus. Tenderness and fever are absent; pressure affords relief.

Since pain, nausea, vomiting and constipation may be due to simple or lead colic and to intestinal obstruction, care is required in the diagnosis. Biliary, renal and gastric colic, have also to be remembered. Colic may likewise accompany any disease of the intestines when there is not obstruction. It is common in children from indigestion of casein and starch, and in adults from more gross causes of intestinal irritation. Some individuals always have colic if they partake of certain articles of food.

In all doubtful cases of severe pain in the abdomen, the safest treatment for the first twenty hours is not even to unload the bowel by enemata, but to give opium and starve the patient. Turpentine fomentations and other applications are useful.

CONSTIPATION.

As the only symptom constipation is of very frequent occurrence at all periods of life; it is a sign of deficient peristalsis or defective moisture of the intestinal contents, probably in many cases of both

causes combined. Even in the healthy, postponement of the hour of alvine evacuation makes defæcation difficult, and the stool is much drier than it should be. The normal stool is cylindrical, dark brown in colour, well lubricated, smooth, and floats in water. A healthy child passes not more than two or three motions a day, and two movements in the twenty-four hours is the proper number up to the age of one year. After this there should be one stool a day. The stools for the first week should have the consistence* of gruel or thick soup, be yellowish white or orange-yellow in tint, with a slightly sour smell and of faintly acid reaction. When the first months have passed the stool increases in consistence and becomes more formed, darker brown in colour, and rather more odorous. A very offensive odour is unnatural, and due frequently to excess of mucus as in rickets. After all the milk teeth have been cut the stool acquires adult characteristics.

The healthy act of defæcation, like all reflex acts, requires a normal state of sensitiveness of the afferent area—the rectal mucous membrane—of the spinal nervous centres and of the motor nerves, also the stimulus itself must be normal; the normal stimulus is the presence in the rectum of normal fæces, for the rectum in health is empty. In old people frequently, and in hysteria, anæsthesia of the rectum may be present, and overloading of it with scybalous pellets may occur until actual intestinal obstruction results. Scybala are hard round marbles of dried fæces, and these result from too long retention in the colon; the great absorbent power of the large bowel explains the dryness of retained fæces.

Eating too little, especially in women, or eating food of too bland a kind, especially in children, sedentary habits in brain workers, inattention to

* See *Health of Children*, by the Author, Lewis, 1887.

nature's calls in young women, boys, and too modest men, are common causes of the habit of constipation. Constipation when well established is easy of diagnosis, but the causes of it in recent cases require to be remembered; it may proceed from nervous disease of the cord or brain, from toxæmia, as in plumbism and jaundice, from atonic dyspepsia, the sympathy of stomach with intestine being its supposed cause; or it may arise from mechanical obstruction.

A man, aged thirty-four, had a well-marked "lead line" and complained of colic, constipation for eight days, and vomiting twice; examination of his rectum showed an epithelioma, causing complete obstruction and requiring colotomy; there was fulness of the flanks and the patient did not look ill; in fact lead colic was the diagnosis until the rectum was explored.

Hard masses, due to fæcal impaction, may be felt in the course of the colon in simple constipation, they are most common in the sigmoid flexure; irritation of these may cause tenesmus and spurious diarrhœa, consisting of slime and blood, with an occasional pellet of hard fæces. Ulceration of the seat of impaction may occur, and may lead to perforation in which case the distension of the colon has probably played its part.

Furred tongue, foul breath, anorexia, sallow face, and mental dejection, are allowed effects of constipation.

Treatment generally consists in removing ascertained causes. Daily solicitation after breakfast, some walking or horse exercise, and the use of oatmeal and a baked apple for breakfast, are in many cases sufficiently corrective of the bad habit. A cigar or pipe may often with advantage accompany the daily solicitation. In cases of severe and chronic sort, keeping the fæces liquid by means of saline aperients—Hunyadi Janos or sulphate of

soda and magnesia dissolved in half a pint of hot water and taken whilst dressing, and during the day if necessary, a little pill of aloine and strychnine being taken every night at dinner, in order to give tone to the muscular coat, is a good method.

Liquid extract of cascara sagrada in the form of fruit lozenges or tablets or capsules, and in doses of ten to twenty drops, or a tamar indien grillon is useful. The habit may be restored by a daily enema of half a pint of tepid water, with a teaspoonful of common salt, continued every day for a week, and then every other day till the purpose is effected. Enemata of soap and water, of glycerine, of castor oil, and of olive oil, are also employed.

It must not be forgotten that artificial aid to the act of defæcation tends to destroy the natural arrangements of the nervous system, and it is well known that a purgative affording temporary relief generally makes the bowel less responsive to natural stimuli. A hale octogenarian told me he had for forty years taken a compound aloes pill every night; a healthy septogenarian had taken half a tamar indien for fifteen years; these and like cases suggest that some drugs may be so popular with the organism as to be regarded rather as natural stimuli than as artificial aids.

DIARRHŒA.

Diarrhœa is described as an excessive frequency and fluidity of the stools; if the stool is solid and too frequent it generally sinks in water, is narrower from not having undergone changes in the colon, which levigate it by the generation of gases. Generally not only is peristalsis too free,

but also intestinal secretion is too great or absorption too little.

As a rule diarrhœa is due to bad food or its consequences, or to some definite disease of the bowel—inflammation, ulceration, new growths, mechanical congestion from portal obstruction; typhoid fever, cholera, dysentery and the inflammatory summer diarrhœas. Fear or nervousness and hysteria may cause it, but generally brain and spinal cord derangements cause constipation.

There are no changes of the anatomy of the bowel that can be with certainty ascribed to diarrhœa, for even the acute cholera infantum and the chronic enteric catarrh of children may reveal no changes, yet both are severe enough, each in its own way, to cause death. There may be no bile in the stools as in the copious serous stools or rice water stools of cholera; or they may be green and like chopped spinach; or very slimy as in rickets and dysentery; or lienteric when the food appears to be undigested, though this last term is often applied to that increased peristalsis in which after each meal defæcation occurs. Mostly stools are very acid, in typhoid fever they are generally alkaline. Diarrhœa, like running at the nose, causes soreness and even eczema, especially in infants. Diarrhœa leads to loss of strength, loss of flesh, and anæmia.

A dose of castor oil may remove the irritant causing diarrhœa. Likewise treatment depends on the cause.

In severe forms the warm bed and a horizontal position with a flannel binder, warm wet compresses or cotton wool bound round the belly, should be ordered. The food should be farinaceous and milky and cold. Vegetables, potatoes, and everything except gruels and milk should be withheld. Brandy and opium or morphia are sheet anchors in severe cases in which death

threatens from syncope or collapse. In many cases, especially in infants, cow's milk should be boiled and skimmed and rendered alkaline with lime water or bicarbonate of soda, and further prevented from clotting by barley water, rice water, gelatine or isinglass; or condensed milk diluted to the starvation point, may prove best, or some of the above mentioned waters without the milk.

In lardaceous disease of the intestine and in tubercular ulceration, diarrhœa often continues in spite of every form of treatment. In chronic diarrhœa raw meat is often effective, and change of air should be prescribed with pernitrate of iron in large doses. Astringents of dilute sulphuric acid, catechu, tannin, logwood, liquid extract of red gum, bael fruit, copper, silver, etc., are useful in chronic stages.*

MELÆNA.

Blood poured out into the stomach goes into the intestines as a perfectly black or "tarry" matter, and hence the name melæna. When blood comes from other parts of the alimentary tract it always preserves a red tint, except perhaps when from the duodenum, where enough gastric juice may exist to turn the hæmoglobin into acid hæmatin. Any hæmorrhage from the bowel is apt to be called melæna, and it must be confessed that a certain blackness of the blood may result when the change is not due to gastric acid, but to some acid generated in the bowel. Bleeding from rectum or sigmoid merely streaks the fæces or discharged slime.

The causes of hæmorrhage from the bowel are

* See *Treatment of Disease in Children*, by the Author.

practically those of hæmatemesis, and are almost identical with those of diarrhœa. Piles, ulcers of the rectum from new growths and syphilis, fissure of the anus, are relegated to surgery, but must be present in the mind of the physician when making a diagnosis.

TYPHLITIS AND PERITYPHLITIS.

The ormer term signifies inflammation of the caput cæcum coli; the latter has been rather pedantically applied to inflammation of the peri-cæcal connective tissue between the cæcum and iliac fascia. Perhaps most of the cases originate in ulceration or perforation of the cæcal appendix.

The cæcum and vermiform appendix may be inflamed by the irritation of scybala, or by a foreign body, and its serous covering may join in the inflammation.

The cæcum may become ulcerated and lead to perityphlitis by actual perforation. Perforation of the appendix is a not uncommon disease and of sudden onset with severe illness, local pains, and tenderness, and often rapidly fatal with signs of acute peritonitis and collapse of nervous system and circulation. Abscesses may result from these affections, and may point in any direction, even through the bladder. The severe pains and tenderness with induration, partly muscular and partly from inflammatory exudation in the right iliac fossa often tend to spread upwards along the colon; a blush in the skin even without œdema and often very small in area is a sign of suppuration. The psoas is often irritated with consequent flexure of thigh. Usually constipation exists. Typhlitis is common in those of sedentary occupation and often recurs. The diagnosis has to be made from pelvic, perinephric, and psoas abscess, and

from typhoid fever. A perityphlitic abscess may burst into the cæcum. That the other above mentioned abscesses may also empty themselves this way will be inferred.

The treatment is by absolute rest in bed, fluid digestible diet, enemata, fomentations with glycerine of belladonna, and by the use of opium. If the pain is bad and fever high, a leech or two is good.

Many lives have been lost and more endangered by the administration of purgatives.

PROCTITIS AND PERIPROCTITIS.

Proctitis and periproctitis are fairly comparable to the inflammations just considered, but the cause of the inflammation is less often in the bowel itself.

The fatty connective tissue around the rectum often inflames and suppurates in the phthisical with or without tubercle; abscesses of pelvic and abdominal origin often spread in this region, and as they may point into the bowel or outside the anus, often leave troublesome fistulæ (*see* surgical works). The symptoms are like those of typhlitis, but defæcation and straining, as from cough, often cause more pain. At first the treatment is also the same as for typhlitis, but surgery then steps in.

INTESTINAL ULCERATION.

Intestinal ulceration of the small intestines is chiefly in the ileum, and of typhoid or tubercular origin; in the duodenum solitary perforating ulcers like those in the stomach. Follicular ulcers of

simple inflammatory origin (as in cholera) are fairly common at necropsies, but do not cause distinctive symptoms. In ulceration of the small bowel griping pains, tenderness, constipation, diarrhœa and melæna are the main symptoms. The sigmoid flexure and rectum are common seats of cancerous, syphilitic and dysenteric ulcers and their consequences, besides pain and tenderness we must recollect that red blood, mucus and pus are often passed with tenesmus and painful defæcation; the stools are usually hard, dry, and streaked with the above-mentioned materials. The cæcum and other parts of the colon often present typhoid and dysenteric ulcers.

Strong purges are to be avoided; opium, conium or hyoscyamus are very useful.

OBSTRUCTION OF THE BOWELS.

Impacted fæces, gallstones and foreign bodies may block the tube from within (intermural). Herniæ, peritoneal bands, diverticula, abscesses and tumours may compress the tube from the outside (extramural). Scars from ulcers or chronic inflammation and new growths in the intestinal wall may narrow the calibre of the bowel even unto complete closure (intramural). The gut may strangulate itself by intussusception or by twisting on itself (volvulus, extramural).

The diagnosis is often difficult.

Simple, or especially lead, colic with constipation and peritonitis, with the above-mentioned causes must not be forgotten. Generally acute cases are in the small bowel and chronic cases in the large bowel and to the left of the median line of the belly.

The symptoms are vomiting, frequently becom-

ing stercoraceous in acute cases, colicky pains, the whirling of the gut being visible through the belly wall, obstinate constipation, hiccough, tympanites, tendency to collapse and mental depression; the pulse is sometimes hard and wiry.

When the obstruction is high up, and when vomiting is copious the urine is scanty and *vice versâ*.

Death occurs in less than a week in acute cases, but may be delayed many weeks, even months, in chronic cases, as in so-called "idiopathic dilatation of the colon."

In front of the obstruction the tube dilates, and in chronic cases there is often catarrh with erosions and great hypertrophy of the muscle wall. Below the obstruction the bowel gets empty and contracted.

When the upper part of the small bowel is blocked, but little tympanites is observed and this in the stomach region, and the vomit may be bilious, not stercoraceous. When the lower part of the ileum is blocked, the tympanites affects the the front of the belly, whereas in sigmoid blockage the flanks are blown up.

Careful palpation under chloroform with digital exploration of the front and back passages is of great value, and the commandment to use the catheter in all belly cases is never to be forgotten.

Internal strangulations, like external herniæ, are most fearfully acute, and tend to end in gangrene. Constrictions and compressions are mostly of gradual course. Old people are the subjects of fæcal impaction of chronic sort; the irregular nodular scybala may be indented by pressure, and may be felt in the rectum as well as through the belly wall in the course of the transverse or descending colon, or in the iliac fossæ especially the left. After typhoid fever they are also very common.

INTUSSUSCEPTION.

More than forty per cent. of cases of intestinal obstruction are intussusceptions.

Intussusception is most common in infants, and if an infant is brought for diarrhœa with blood and slime, it is a cardinal rule never to omit to examine for a tumour. An intussusception generally arises by one part of the bowel being dilated and paralysed, and the part above being in a state of peristalsis; by this means it is conceivable, especially if there should be at the distal end of the contracting bowel a polypus or its equivalent, that the contracting gut should become enclosed by the paralysed gut in such a manner as to make three tubes; the outermost or intussuscipiens enclosing the middle and inner tubes (intussusceptum); the middle tube is formed from the involution of the outer tube so that the middle and inner tubes are in contact by their serous coats. The head of the intussusceptum is always the same structure or part of the bowel, and is the point of juncture of the inner and middle tubes. The mesenteric attachment is a drag on the intussusceptum, and causes the mouth to glide on one side of the outer tube. The most common head of the intussusceptum is the ileocæcal orifice which probably acts as the equivalent of a polypus in the production of the intussusception, and this head may travel into the rectum or outside the anus, thus causing involution of several feet of the ileum. In intussusception, as in bowel obstruction generally, the danger lies in the obstruction of the circulation of blood through the mesentery and bowel whence the intussusceptum becomes congested and swollen with œdema, and hæmorrhages may occur into the bowel coats and into the tube; inflammation of the peritoneal coats follows from

this circulatory disturbance and gangrene may result. Occasionally the slough is passed as a stool, and the intussusception cured by natural adhesions of the serous coats of the outer and inner tubes. As the intussusceptum often gets into the descending colon, the usual symptoms pointing to affection of this region are often present: tormina, tenesmus, with bloody and slimy stools. The onset is often sudden and in the midst of a diarrhœa may be thought to be violent colic; the cylindrical tumour is most commonly felt to the left of the median line, and may be touched by rectal examination.

Treatment of Obstruction.—After careful examination never purge but give opium freely, combined with belladonna. The bowels may be relieved by small enemata. Thirst, vomiting, and tympanites, are relieved by the usual means. Small doses of cold or effervescing liquids, nutrient enemata and zyminised suppositories may be used in severe cases. Injection of air, water or oil, reposition by manipulation, and other means for relieving intussusception are usually carried out by surgeons.

In acute cases of doubtful diagnosis the aid of the surgeon who understands antiseptics, should be sought with a view to some form of abdominal section. Most chronic cases being in the sigmoid flexure and rectum should be relieved by colotomy.

DYSENTERY.

Dysentery is probably a specific disease due to some definite cause, probably a micro-organism, and may be compared with typhoid fever, but with the chief localisation in the descending parts of the large bowel, and with more tendency to pass into chronic ulceration with consequent deteriora-

tion of general health. It is often epidemic and sometimes sporadic; its chief geographical site is the tropics. Any unhygienic condition is favourable to its development: low state of health, bad water and vitiated air. It is not caught merely by being in its presence: probably not contagious, nor infectious. The stools most likely contain the virus, but this has to be passed through a change before it can cause the disease in another. Some authorities deny the specificity of dysentery, and some say it is diphtheria of the large bowel. The inflammation attacks all parts of the mucous membrane of the large bowel but especially the solitary follicles of lymphoid tissue, the lower parts of the descending colon being most diseased, but the whole colon may be involved and very rarely the ileum. Exudation takes place into the tissues and on to the surface of the membrane; ulceration occurs especially at the lymphoid follicles and the tops of the folds of mucous membrane; in chronic cases much induration of the bowel results so that the colon may be converted at parts into a rigid tube; sloughing and ulceration are generally combined so that extensive destruction may occur, and severe hæmorrhage or perforation of bowel thus result.

The scarring may lead to constriction of the tube. Pyæmia sometimes occurs with abscesses in the liver, and inflammations of the thoracic viscera and serous membranes; the meso-colic and mesenteric glands swell and may soften and caseate. Malarial fevers are often rife at the same place and time, and even in the same patient.

Griping pains called tormina set in with frequent desire to go to stool, during which thin mucous and bloody evacuations, often mixed with hard dry lumps of fæces (scybala), are passed with tenesmus (tetanus of the rectum). The stools become fœtid, of dark but changing colour, and mixed

with shreds of lymph or actual sloughs. The tenesmus becomes associated with strangury (tetanus of the bladder), the urine getting scanty, high-coloured, and scalding the urethra. Fever of severe type tending towards rapid prostration is manifested by the usual signs.

Much tenderness and tympanites with hiccough and the typhoid state are apt to appear.

Death occurs in five to ten per cent. of the cases from the severity of the disease, but many more die from its consequences on the bowel, and indirectly on the blood, strength and flesh; the whole body wasting much as in tabes mesenterica.

Treatment.—Demulcent drinks like barley water; farinaceous and milk and broth diet; a warm bath, cold wet compresses, hot fomentations with glycerine of belladonna or poultices to the abdomen; gruel enemata and ipecacuanha in doses of three to six grains every four or six hours. Some give twenty or thirty grain doses, and repeat these a few times. Some guard these doses with opium: others do not. A hypodermic of morphia or a morphia suppository if retained may give relief. Castor oil is useful if constipation exists.

In chronic dysentery maintain the strength by nourishing fluid diet, peptonised if desirable, and give malt, oil and steel wine, if these do not increase the diarrhœa. Many advise voluminous enemata—two or three pints—of a solution of nitrate of silver, one grain to the ounce. A change of climate is highly desirable. A flannel belt with a layer of cotton-wool should be worn. Astringents and opiates are useful to check diarrhœa.

INFLAMMATION OF THE BOWELS.

THERE is simple catarrh of the mucous membrane, which may become chronic as in other places, and may lead to erosions and follicular ulcers. The causes and pathology are identical with those of gastric catarrh.

Severe inflammation, the phlegmon of Cullen, causes the same symptoms as obstruction of the bowels (which see). In this affection all the coats of the bowel become œdematous and much congested, the peritoneum being coated with lymph.

A croupous or membranous inflammation especially in women occurs, in which large casts of the bowel may be passed in the stools.

Lientery is a term applied to diarrhœa, in which food, but little altered, is rapidly passed through the alimentary canal, especially after eating.

The general symptoms are colicky pains about the umbilicus with tenderness, tympanites and diarrhœa or constipation. If the large bowel is affected, slime and blood are seen in the stools; visible slime is absent when the small bowel only is affected. The stools are most offensive when there is visible mucus. Debility, anæmia, and emaciation, with thirst and anorexia, are the usual consequences.

Jaundice may occur when the duodenum is affected. The presence of unchanged bile pigment, much fat and undigested food, indicates either that the ileum is involved or that the large bowel has hurried the intestinal contents onwards with great rapidity. When the large bowel is not involved constipation, not diarrhœa is the rule. Normal fæces should float in water, stools of diarrhœa often do not, because the gaseous changes which naturally occur in the large bowel have had no time to take place.

These affections are most common in infants.* Cholera infantum is an acute disease characterised by the passage of copious serous stools of rice-watery appearance, by rapid collapse, sunken eyes with dark areola, high fever (103°-106°) and vomiting. Other severe inflammatory diarrhœas have the same general symptoms, but the stools vary greatly in colour, consistence and odour.

The treatment consists of rest in bed with warm covering to the abdomen, and counter-irritation of the same with fomentations or mustard; careful diet; often avoiding milk, and always avoiding pastry and vegetables; giving cold liquid farinaceous food; if necessary opium and stimulants during the early stages; bismuth; castor oil mixture when the stools are slimy; astringents when the stools are watery and the case has become chronic, and antiseptics especially salicylate of soda. In very chronic cases tepid salt water (℥j to Oj) injections every morning appear to do good. In many instances the substitution of rusks, malted biscuits and toast, for bread and other farinacea is useful, and sometimes the starchy food should be kept at a minimum, because of its tendency to fermentation when not digested, thereby increasing irritation and the production of slime (*see* Diarrhœa).

TUBERCULAR DISEASES OF ABDOMEN.

Either before or after inflammatory swelling of the Peyer's and other lymphoid patches of the intestines and serous membranes, which are nothing more than enormous lymphatic spaces, the tubercle bacilli effect an entrance, and flourish, producing nodules with their somewhat peculiar histological structure. In these structures and in the inflamma-

* See the Author's *Treatment of Disease in Children.* Lewis.

tory products, which often surround them, caseous, (fatty), fibroid and calcareous changes set in with the usual results. When peritoneum, mucous membrane and mesenteric glands participate in the tuberculisation vast destruction may result, and the necropsy may present an inextricable matting together of the coils of the intestine, with great ulcers almost encircling the ileum and cæcum, some of which may have bored their way through the dense hard fibroid or fibro-caseous plaques into adjacent intestinal coils, or even into extra-abdominal space through an umbilical fistula which may have long discharged during life. Sometimes the tuberculosis only produces a light form of peritonitis, the lymph being slight in amount and delicate in texture, the adherent twists of gut may be more easily separated, and miliary nodules may be more easily defined than in the more toughly fibroid varieties. Especially in children may be seen tubercles of all kinds in the liver, spleen and kidneys, so that wherever lymph vessels run tubercles may be gathered together. Around the tubercular ulcers with their indurated bases, craggy thick edges and tendency to spread transversely, are seen in radiating lines on the peritoneal surface, numerous nodules of tubercle which grow less in number as they spread further away from the ulcer. Tubercular disease of similar sort is usually found in the thorax, and in other viscera. As elsewhere some scarring and healing with constriction may occur, but except in some cases in children such extensive disease is often the beginning of the end.

Tubercular peritonitis usually develops slowly by vague signs of illness. In typical cases pains, both peritonitic and colicky, tenderness, tympanites, constipation and indurated bands or lumps are present; the smouldering affection may suddenly assume activity with acute inflammatory signs or

a rapid ascites of variable quantity may appear. Fever is often present, sometimes absent. The diagnosis may have to be made in some cases merely on a sense of doughy resistance—together with signs of gastro-intestinal disorder—to be felt on palpation. The symptoms must be relieved by the usual remedies; rest in bed, cold wet compresses and, if possible, frictions with sweet oil, are valuable.

Tabes mesenterica is a wasting disease due to want of absorption of chyle, resulting from scrofulous or tubercular disease of the glands of the mesentery and meso-colon. It is most common in children. The treatment is that for chronic intestinal catarrh and scrofula. The disease is sometimes confounded with tubercular peritonitis.

Tubercular disease of the bowel is secondary, usually to that of the lung, but may, especially in children, be synchronous with general tuberculosis. Obstinate diarrhœa with melæna suggests ulceration in the presence of phthisis or tuberculosis, but sometimes pain and tenderness or constipation may be the only symptoms. Large doses of bismuth, salicylate of soda, sulphate of copper, with other remedies for diarrhœa, may be tried.

CANCER OF THE BOWEL.

Cancer of the bowel has been considered under intestinal obstruction. The fæces are often narrow and small for some time before the obstruction becomes complete. Cylindrical epithelioma is the commonest variety at the sigmoid flexure and rectum; secondary deposits are frequent in the liver. The disease lasts about eighteen months. Other forms of new growths occur at other parts of the intestines, but they are comparatively rare.

Cancer does occur at and about the ileo-cæcal valve.

Section IX.

INTESTINAL WORMS.

CESTOID OR TAPEWORMS.

Three worms of this kind are found in the human intestine. They all undergo a most extraordinary series of changes in their life history. The strobile or perfect animal consists of a head, neck and body composed of proglottides in which segments the ova ripen; the ova discharged into the external world get into water, on to plants, and are swallowed by pigs or cattle. The ripe egg reaches the stomach in which the gastric juice dissolves off the shell, and the six-hooked embryo (scolex) is set free to migrate through the stomach or intestine and into some distant viscus, it may be the liver. It develops into a hydatid, or bladder-worm (cysticercus) of measly pork, echinococcus of human liver, cœnurus of the brain of sheep. Beyond this metamorphosis, it cannot go until it is once more swallowed by a carnivorous animal; in the stomach the "caudal vesicle" dissolves, but the head and neck resist the action of the gastric juice, pass on to the intestine, and there become fastened by means of the hooks and suckers, and then grow into a perfect strobile.

Tænia solium is the adult state of the cysticercus cellulosus of measly pork, its head is the size of a pin's head and often pigmented, it is armed with four suckers, and with a proboscis or rostellum, at the base of which is a circle of curved silicious hooks of two sizes alternating; more than one worm frequently exists in its habitat, the small intestine. The ova are spherical, have a

thick striated shell, and measure $\frac{1}{750}$ inch in diameter.

Tænia mediocanellata is the adult state of the bladder-worm found in beef, its head is large but "unarmed," having no snout or circle of hooks, its sexual tubes are more numerous and more ramified than those of tænia solium and its entire length is greater; the ova are oval and larger than those of tænia solium.

Bothriocephalus latus is believed to be the adult state of a cysticercus found in fish, whelks, mussels and oysters; it is the longest of all the tapeworms and most common in Switzerland. The club-shaped head has no snout or hooks, but a long lateral groove or sucker on each side, and the segments are always broader than they are long; in tænia solium this obtains only in the newly formed segments near the neck, the ripe proglottides being longer than they are broad; the ova of bothriocephalus latus are oval, brown coloured and provided with a thin shell which opens at one end by a neat lid or operculum.

The symptoms of tapeworms are indefinite and referred to every system of the body; the segments should be looked for in the stools, and they exhibit lively movements when warm. A little oxide of mercury ointment will relieve itching of the anus.

Treatment.—Nothing but broths and a little gruel should be allowed for one day, then a purge of castor oil at night, next morning after the bowels have acted, a draught composed of half a drachm or a drachm of the liquid extract of male fern with a drachm of mucilage of acacia or tragacanth, and five drops of spirit of chloroform with an ounce and a half of pepperment water, should be given, every subsequent stool should be strained carefully through muslin and the head or heads sought for.

NEMATOID OR ROUND WORMS.

The **ascaris lumbricoides** is in shape and size nearly like the common garden worm; they may be very numerous or solitary; the males are about half the length of the females and more curved behind where the sexual apparatus exists; the females are straighter and thicker behind than the males, and the vagina is situate at the junction of the first and second thirds of the body length; they reside in the small intestines, whence they may wander into many parts—into the stomach, gullet, mouth, nose, larynx, peritoneum, vagina, urinary or biliary passages.

The ripe eggs are oval, have a double chitinous brownish tuberculated coat with radiate markings, and are about $\frac{1}{500}$ inch in diameter.

Symptoms are often absent, fits have been apparently caused by them as by other worms. Santonin in a capsule or in iced water in doses of two grains or more is the best remedy, and a purge of compound jalap powder is decidedly adjuvant.

Thread worms — oxyuris vermicularis — are very narrow and short, the males being about one or two lines in length, and the female five lines. The head has a mouth and three slightly marked lips, and there is a thin fin-like vertical membrane above and below the head; the male is curved behind where the genitals are, the female is straighter and has the vagina at the junction of the first and second thirds of the body, these facts are easy to remember because they are the same as for the round worm. The chief residence is the cæcum, whence they migrate all along to the anus out of which they crawl, on to the surface, into the vagina, or beneath the prepuce. The ova are $\frac{1}{500}$

inch in length, flattened on one side, and convex elsewhere.

These worms are associated with chronic catarrh of the large bowel, and it is the mucus resulting from the catarrh which is the favourable soil for the growth of the worms; the object of all treatment should be to cure the catarrh.

Perfect cleanliness of the bottom should be maintained because there can be no doubt that the ova are swallowed by an obvious agency.

A flannel binder to the belly, avoidance of sugary substances and of too much starchy food, and the administration of chloride of sodium with the food are important instructions. An exclusive meat diet for a few days is often very valuable.

Tepid enemata of salt and water, one drachm to the pint, should be given every morning for at least one month. I am convinced that this rectal medication is most valuable, not so much in killing the worms as in improving the state of the mucous membrane. Chloride of ammonium, alum, boric acid, in the same doses are also useful in grown up children.

A mixture of rhubarb and soda or gentian and soda is also good, and fresh air with tonics should be afterwards prescribed.

Tricocephalus dispar causes no symptoms, but it may be seen or its ova found in the fæces. It is like a piece of thread and one to two inches long, the hind part is thick and the front capilliform; the male is smaller and curved behind, the ova are oval, brown, and have a knob at either end.

Children may pass curious shapes in the fæces recalling worms and other foreign bodies, they are sometimes composed of casein and fat of milk, iodine does not blacken them as it would starch, they dissolve in ether and liquor potassæ.

Pruritus ani if not relieved by any mercurial ointment, should be treated with belladonna or

cocaine, painting the anus with the tincture of belladonna after careful cleansing and drying of the parts, or with a ten per cent. solution of cocaine; the brush may be introduced once within the anal orifice.

TRICHINOSIS.

Trichinosis is a disease which may be mistaken during life for typhoid fever or tuberculosis and rheumatism. The symptoms point chiefly at first to gastro-intestinal disturbance: furred tongue, nausea, indigestion, vomiting, diarrhœa and pains. After a week the pains and distress are transferred to the muscular tissues, and rheumatism is thought of, the muscles being tender there is dislike to movement and stiffness with perhaps swelling, but not of the joints. Dropsy may develop at the end of another week, first in the eyelids resembling renal rather than cardiac anasarca. Fever is not usually more than 102°; sweating may be profuse. The tenderness, swelling and stiffness of the trunk muscles may cause opisthotonos and cerebro-spinal meningitis has been diagnosed. The duration of the disease is about four weeks in fatal cases; death results from exhaustion, from ulceration of the colon, or an attack of pneumonia. Convalescence is very slow if recovery does occur.

It is advised to search the stools for the adult trichina.

Pork is the medium by which the disease is taken. The cysts of the worm in the muscles of the pig are dissolved in the stomach by the gastric juice, and the embryos being liberated soon attain maturity in the intestinal canal. An animal fed on trichinous pork has been killed in forty-eight hours, and the slime lining its alimentary tract

was found to swarm with sexually mature living worms; they are only about a line in length, the males as usual being the smaller. Each female is believed to produce one hundred and fifty young worms.

The living embryos soon bore their way through the walls of the intestine and migrate or are carried to the muscles where they become encysted in enormous numbers, it has been calculated that twenty millions may exist in the muscles of one human being. After a time the cysts become calcified and die away.

In epidemics trichinosis is early diagnosed, and then brisk purgatives are most useful in ridding the intestines of the multitudinous embryos.

Section X.

DISEASES OF THE LIVER.

In considering diseases of the liver, the fundamental facts to bear in mind are: its great activity as a metabolic agent breaking down albuminoids and its influence in the blood-making processes, hence, any disease which largely destroys the working tissue will lead to emaciation and anæmia; the quantity of urea discharged per diem will be greatly diminished, even the urea may almost disappear from the urine, tyrosin and leucin seeming to take its place as in acute yellow atrophy. The liver also suffers in all general diseases and many of the symptoms are due to the hepatic disturbance.

Four sets of tubes permeate all parts of the

liver; the portal veins and hepatic artery bringing material, and the bile ducts and hepatic veins carrying away. The student may be impressed also with the circumstance that the portal circulation is at the mercy of the inspiration which aspirates blood rapidly out of the liver, and also he should remember that the movements of the bowels and of the body can but tend to send the blood faster onwards to the liver by the valveless portal veins; if sedentary habits with imperfect respiration do not cause sluggish flow of blood through the liver we should be surprised at the efficiency of the *vis a tergo* in that individual who was so fortunate as to escape the consequences of of such unwholesome habits.

Emboli may pass along the portal vein as in dysentery and bowel disease; ascites and piles and melæna must almost inevitably ensue from portal obstruction. Calculi pass along the bile ducts and common bile duct. The area of distribution of the hepatic artery is the first site for waxy disease. So that these sets of tubes are powerful means for the production of disease.

It will also be evident that the liver is at the mercy of its sets of tubes, and consequently that most of its diseases like the diseases of the lymphatic glands are deuteropathic, which is secondary to disease of other connected organs.

SLUGGISH LIVER.

Torpidity or inactivity of the liver appears to be a real affection. Like gastric weakness, liver dyspepsia consists in defective activity of the functions, the protoplasm not performing its work efficiently. The probable work of the hepatic cells is to transform proteids into urea, to make

glycogen and to turn out bile—the last mechanism being effected either by the destruction of red blood disks (hæmatolysis), or by dealing with the products of destruction of red blood corpuscles brought to the liver by the splenic veins from the spleen.

The symptoms of biliousness or sluggish liver are like those of dyspepsia. Perhaps the mental symptoms are more pronounced, and hot palms and soles, and clammy sweats of the same parts are more marked symptoms; the fur on the tongue is yellowish and a bitter taste in the mouth may be complained of.

That the liver does not work properly is seen in the pink or dark brown lithates, this excessive amount of urates being due to incomplete transformation of proteids into urea. In some cases of biliousness the urea excreted in the twenty-four hours, is not diminished, and yet the urates are in excess; in these there is always an intake of nitrogenous food in excess of the powers of the hepatic cells, though the stomach and pancreas may have been equal to the occasion and converted the food proteids into peptones.

The distress of the liver is felt by the patient as an uncomfortable sensation in the right hypochondrium, worse after meals, and the pain may irradiate into the right shoulder.

The liver not working properly leads to overcharging of the blood with urates or lithates—hence called lithæmia, on which gout is held to depend.

Murchison ascribed to liver disorder many affections of the nervous system, of the mucous membranes, skin, and other tissues.

Undoubtedly in cases presenting obscure combinations of symptoms, gout, not revealing itself in its usual classical ways, should be borne in mind. The author has cured curious cases of

neurasthenia by proper dieting and remedies directed against hepatic disorder.

CONGESTION OF THE LIVER.

The initial step in many of its diseases is either active or passive congestion. Passive congestion due to heart or chronic lung disease may proceed to red atrophy of the liver. Any irritation brought to the liver along the portal veins generally leads to active hyperæmia, and the liver often sympathises with affections of the stomach; so that the symptoms of acute gastric catarrh may be with difficulty separated from those due to hepatic congestion: slight jaundice, nausea, and dyspepsia, scanty urine, constipation, and enlargement of the hæmorrhoidal veins. Palpation and percussion may prove that the liver is enlarged and tender.

The best treatment is semi-starvation, sweating and a watery purge of Friedrichshall or effervescing sulphate of soda.

The liver is always fuller of blood, and its protoplasm more active during digestion, hence the importance of semi-starvation in reducing hyperæmia, and hence also the necessity for those of plethoric habit not leading a sedentary life. Active exercise in the open air as a preventive of chronic congestion and cirrhosis is scientifically shown to be right on the physiological principles already mentioned.

Occasionally extravasated areas of blood are found in the hepatic tissue, or beneath its capsule, in cases of serious toxæmia, such as purpura, scurvy, septicæmia and malarial fevers — old authors spoke of apoplexy of the liver; but such hæmorrhages only seldom form large masses, and are as a rule similar to the petechiæ and vibices found in the heart and lungs beneath the serous membranes and in the skin.

INFLAMMATIONS OF THE LIVER.

Inflammations of the liver are common diseases especially of tropical regions.

Hepatitis and perihepatitis often occur together just as in pleuro-pneumonia.

Hyperæmia, followed by exudation and other inflammatory changes, may resolve or may proceed to suppuration, the centre of the inflamed area becoming purulent whilst the periphery may undergo organisation, a fibroid capsule enclosing the abscess.

It is strange that tropical abscesses should be solitary because it is certain that they, like the multiple pyæmic abscesses, are nearly always secondary to disease in the district of the portal veins. Dysenteric ulcers, other intestinal ulcers, gastric ulcers, ulceration of the gall bladder and bile ducts, supply septic or other irritant material which causes the suppurative inflammation. Sometimes the portal vein is inflamed and thrombosed (pylephlebitis, and this of a suppurative character), of which a good example occasionally occurs in the new-born from infective ulceration of the umbilicus.

That great heat of the environment, malaria, chills, spirit drinking, excessive eating and sedentary habits, can cause congestion of the liver seems perfectly conceivable; but in these days of more exact pathology it is difficult to believe that these causes can set up suppuration; most probably in all abscesses a septic or infective poison has been at work.

An abscess in the liver may dry up into a putty-like, caseous and calcareous mass, but often it points and may discharge either on to the surface of the belly, into the peritoneum or pleura, or

through the lung, adhesions having formed. They have burst also into the stomach, gall bladder, hepatic duct, hepatic or portal vein, vena cava inferior, pelvis of the right kidney, pericardium, and they have occasionally gravitated into the pelvis.

The symptoms are precisely like those of severe suppuration anywhere.

Pain and tenderness over the liver, radiating if the peritoneal surface is inflamed into the right shoulder and between the scapulæ; pain from deep breathing or coughing because this moves the liver; short dry cough probably from the pleura being slightly involved; and the usual symptoms of fever. Jaundice and ascites are rare but may occur. A smooth tumour with enlargement of the liver may be found, giving the usual signs of an abscess—fluctuation, &c. The liver may not be obviously enlarged; friction at the base of the right side of the thorax may be the only physical sign; the heart's apex beat is often displaced outwards and upwards.

Exploration with the aspirateur may have to be employed in diagnosis.

The general symptoms are quite ordinary; chills at the onset and fever of hectic type with sweatings; emaciation, anæmia and loss of strength; a typhoid state is common.

Aspiration and laying the abscess open just as in empyema is the treatment.

PERIHEPATITIS.

PERIHEPATITIS of chronic sort leading to a dense coating of the liver with a new-formed generally fenestrated membrane of not inconsiderable thickness is usually associated with general peritonitis;

alcohol and syphilis are ascribed causes. It is questionable whether this perihepatitis can cause atrophy of the liver unless it happens to constrict the portal and hepatic vessels in the portal fissure.

In chronic heart disease patients sometimes complain for days together of repeated attacks of severe pain over the liver, which may be enlarged and is always tender; some believe this is due to simple congestion, others to perihepatitis; a necropsy often shows some thickening of the capsule. Jaundice and ascites naturally result if Glisson's capsule is thickened and constricts the bile ducts or portal vein.

CATARRH OF THE BILE DUCTS.

CATARRH of the bile ducts is common in children and at all ages, being a companion to the catarrh of the duodenum. It doubtless complicates many organic liver diseases and gall stones; fever of any kind may originate it.

Jaundice, some tenderness and swelling of the liver with nausea and nearly colourless offensive clayey motions are the chief symptoms. Most simple cases recover in a few weeks or days, but at times jaundice may last for a year or more, and then recover; when we can only suppose that the catarrh was unusually chronic. Simple stricture from exudation, as in urethral stricture from chronic gleet, has been the cause of very chronic jaundice.

Sulphate of soda to keep the bowels moved; hot water in half pint doses to remove the mucus and encourage the discharge of mucus from the common bile duct; very light diet of milk and farinaceous food is the treatment.

ACUTE YELLOW ATROPHY.

Acute yellow atrophy is characterised by a tendency to total loss of function of the liver, but whether this is accompanied by an inflammatory change or a rapid degeneration of the liver remains unsolved, because the post-mortem appearances of the liver on microscopical examination may be differently interpreted.

All the symptoms are believed to be really due to paralysis of the hepatic functions attended with rapid atrophy of the organ. It often occurs in relationship with pregnancy; the disease may arise independently, the patient becoming ill whilst in the midst of sound health and dying without any signs after death than the peculiar wasting of the liver and its results.

The typhus, scarlatinal and malarial poisons have been credited with the power of causing the disease, and some have attributed it to the action of a special micrococcus. Females suffer more frequently than males; children are very rarely its subjects.

The liver is much shrunken and weighs very much less; on section it is found softened, the outlines of the lobules are indistinct. Fatty degeneration, an apparent increase in the number of small bile ducts, and sometimes a small round celled grayish-red exudation are the chief changes.

The symptoms set in more or less rapidly without fever as a rule; the typhoid state rapidly develops, purpura and hæmorrhages are common; cerebral symptoms often marked: there are great variations in pulse-rate, vomiting and constipation. The urine and blood contain much leucin in the form of spherical globules, and tyrosin in the form of clusters of needles.

Recovery never occurs in well-marked cases.

The treatment is like that for typhus fever. Phosphorus poisoning closely resembles acute yellow atrophy.

CIRRHOSIS OF THE LIVER.

HABITUAL spirit drinking is the cause of the common sclerosis of the liver; the multilobular sclerosis of Charcot. Hyperæmia, exudation, fibroid thickening, are the main stages in the production of the gin-drinker's or hobnailed liver. The process is very like that which causes the granular contracting kidney, and it is most frequent in middle aged males. At first the liver may be enlarged, but the cicatrisation, which chiefly follows the branching of Glisson's capsule around the portal veins, is accompanied by atrophy and some fatty degeneration of the liver cells.

The symptoms at first are those of combined gastric catarrh, *q.v.*, and hepatic congestion or of alcoholism; nausea and retching in the morning before breakfast being a marked sign, whilst diarrhœa or constipation replaces the regular action of the bowels. Ascites is often the main sign when the disease is confirmed; jaundice is usually slight; hæmatemesis and melæna with piles and splenic enlargement may be expected, and the veins of the cheeks and abdomen are enlarged. The urine is generally scanty, high coloured and deposits pink or fawn coloured urates.

Emaciation, anæmia and debility are commensurate with the progress of the liver destruction; delirium, convulsions and coma may be ascribed to the toxæmia resulting from hepatic degeneration and renal inadequacy.

Life may be lost from severe hæmatemesis.

Alcoholic neuritis may complicate cirrhosis of the liver.

Ascites and loss of flesh, blood and strength being the main symptoms of chronic abdominal disease, the diagnosis in the absence of a good history may be perplexing, but the nose and cheeks often indicate the drinking habit (*see* Alcoholism).

The diminution in the size of the liver is not always easy to detect, and in cases of assumed atrophic cirrhosis on removing ascitic fluid the hard liver evidently enlarged may be felt below the ribs.

It seems certain that hypertrophic cirrhoses are really due to alcoholism; some have been attributed to chill. In some cases jaundice is the first and most prominent symptom, the newly formed inflammatory tissue appearing first round the bile ducts in Glisson's capsule; in these cases the sclerotic process may tend to be unilobular (Charcot), each hepatic lobule being surrounded by the new connective tissue, just as happens in experimental cirrhosis from ligature of the bile ducts. The question naturally arises whether these forms of cirrhosis may not be caused by irritant matters in the bile ducts.

A pericellular form of cirrhosis also occurs, in which each hepatic cells gets surrounded by fibroid tissue; this seems generally due to syphilis, especially in new-born and young infants; the liver remains as in the unilobular variety, smooth on the surface; the consistence, at first often diminished, if the case lasts longer is increased.

Most of these processes are not attended with fever, and the scanty urine is not easily explained when ascites is absent.

In the early stages all spirits, wines, beers, spices and condiments should be disallowed, the food should be milk, fish and farinaceous articles given several times a day; woollen clothing, exer-

cise and massage are good. The craving for drink may be allayed by tincture of capsicum, introduced in a mixture of bismuth and pepsin. If improvement follows, meat and vegetables in moderation may be allowed. Chloride of ammonium, taraxacum juice, bitter infusions and diluted acids are believed to increase the functions of the liver. Saline purgatives of sulphate of soda and magnesia; iodide of potassium, and the inunction of iodide of potassium or iodide of mercury are also favourite medicines. Ascites, *q. v.*, may require repeated tapping if not removable by diuretics and purgatives, and if the distress or dyspnœa cannot be relieved by other means.

OTHER CHRONIC ATROPHIES.

The liver may become chronically atrophied in cases of malarial poisoning, and in cases of cancerous or simple ulceration of the stomach or bowels; blocking of the portal capillaries by melanin particles in the former (the pigment liver), and by emboli in the latter case is the assumed mechanism.

Red atrophy or nutmeg liver is also attended with overgrowth of the connective tissue due to chronic congestion the result of heart or lung disease.

The gross symptoms of these chronic atrophies, ascites, melæna, etc., are attributable to portal obstruction.

ENLARGEMENTS OF THE LIVER.

The chief painless enlargements of the liver are fatty infiltration, lardaceous disease, diabetic, rickety and lymphatic enlargement, and hydatid

tumour. They are all secondary to disease elsewhere, and are of use as clinical signs mainly in the diagnosis of their cause.

Cancer and syphilitic enlargements are sometimes not tender, but generally painful.

Congestion, inflammation and abscess cause a tender enlargement of the liver, as does also obstruction of the bile ducts. In infants the liver is naturally large.

Fatty livers may be produced like the *foiè gras* of Strasburg geese by over-feeding and under exercising in an impure heated atmosphere. In consumption a fatty liver is not uncommon, and the essential causes paradoxical as it may appear are the same. The true liver cells become vessels for the reception of the oil. A somewhat nutmeg-like appearance on section may obtain with a certain degree of fatty infiltration reminding one of the cardiac liver.

Fatty liver does not ordinarily cause symptoms, and if it is the sole disease from which the patient suffers the diet should be restricted, exercise freely taken in the fresh air and the bowels kept regular by aloes and salines.

Waxy or lardaceous liver differs from fatty in being heavy as well as large and brittle instead of greasy, but the two morbid processes are often concurrent, and in syphilis fibroid patches may be present likewise. It does not cause special symptoms; albuminuria usually co-exists, and the spleen is generally enlarged.

When the cause of the disease can be removed by treatment, the waxy change may also disappear, and even completely—witness cases of Pott's disease and hip-joint disease treated by aseptic methods. Plenty of fresh air with iodides or tincture of iodine in fifteen minim doses is the treatment.

HYDATID OF LIVER.

A HYDATID tumour enlarges the liver only in one direction, not uniformly, and curiously enough it may never trouble the patient even when very large. The tænia echinococcus inhabits the intestine of the dog, it is only $\frac{1}{6}$ inch in length, and has but four segments, in the hindmost is the genital apparatus, the head presents a proboscis, hooklets and suckers like the tænia solium. The ova are discharged with the fæces of the dog and get into the human stomach with the drinking water, or on food which has been exposed to the dust of the atmosphere.

London dogs often show many tæniæ in their intestines. The gastric juice dissolves the shell of the ovum, and thus liberates the six-hooked solid embryo which finds its way into the sub-peritoneum, liver or kidney. The hooks then disappear, and the solid cellular scolex or embryo gets transformed into a bladder containing transparent fluid. This is the mode of origin of the "mother cyst" which is composed of three coats; (1) the fibrous capsule derived from the liver is the result of chronic inflammation due to irritation of the hydatid vesicle; (2) the ectocyst is a very remarkable elastic membrane which curls up when split in such a fashion as to turn the innermost coat or endocyst outside; it is composed of modified chitin and is beautifully laminated; under the microscope it shows a series of parallel finely dotted lines; (3) the endocyst is composed of granular cells and contains numerous calcareous corpuscles. Budding from the inner coat of the mother cyst produces "daughter cysts," and from the inner coat of the latter "grand-daughter cysts." In some of these secondary cysts scolices develop

with their hooklets, snout and suckers, then the secondary cyst is called a "brood capsule"; if no budding or formation of scolices occurs the cyst is called "acephalocyst." Sometimes the budding occurs on the outside of the mother cyst, and sometimes the growth appears to spread along lymphatic or other spaces in the liver (multilocular hydatids).

Hydatids may die and dry up, a putty-like mass alone remaining, or they may burst in any direction, but most commonly into the stomach, intestines or lung; rupture into the peritoneum or pleura is not always fatal; it may be determined by a blow. Suppuration is not uncommon in hydatids, and the multilocular variety which is very rare generally shows signs of pus at the necropsy. A bile-duct opening into a hydatid has been frequently seen, and hydatids travelling along bile ducts is another event attended by fever and jaundice. As a rule neither jaundice nor dropsy nor hæmatemesis results from hydatid of the liver. The hydatid fremitus, evoked by percussing the middle of three fingers of the left hand laid over the seat of the tumour, is a peculiar tremulous long-drawn thrill, and is due not to the shaking of the contents of the mother cyst, but to a certain degree of tension of the fluid, for the same kind of fremitus has been obtained in ascites and in par-ovarian and ovarian cysts.

The best treatment of hydatids is puncture with a fine trocar and the drawing off of a few ounces of the fluid which contains no albumen and has a low specific gravity. The life of the hydatid appears to depend on a certain degree of tension of sac, and the removal of even a small portion of the fluid sometimes causes its death. If this does not succeed, abdominal section by the two-stage method should be performed with all the appliances of antiseptic surgery. Puncture of the

hydatid and spontaneous rupture of it into the peritoneum has been followed by an urticaria, as has also experimental subcutaneous injection of hydatid fluid into another person.

A distended gall bladder and a hydronephrotic cyst of the right side being so close to the liver may be mistaken for hydatid of this organ; the former is usually attended with jaundice, and the latter fills the loin more than liver cysts usually do and has the colon in front of it, but the withdrawal of the fluid by puncture *may* be the only certain means of diagnosis. The liver may be enlarged with "bossy" prominences in cases of syphilis—fibroid puckerings causing the protuberance and gummata and waxy change may be associated, indeed several times at University College Hospital and at Guy's Hospital (*see* Fagge's Medicine) such a liver—which need not give much pain—has been mistaken for a hydatid.

Cancerous tumours and chronic pleural effusions have also given trouble in diagnosis, but the severe pain and emaciation in the former, and the shape of the dulness in the latter generally afford a means of diagnosis. If the hydatid is still confined within the limits of its capsule it cannot produce dulness all round the side as does a pleural effusion unless the latter should be localised by adhesions. The following case is worthy of record:—A young woman, aged 20, was sent as a case of pleuritic effusion of the right side, she coughed up much muco-pus, and in this laminated colourless hydatid membrane was detected; Mr. MacReady made an incision in the ninth space in the midaxillary line, resected two inches of the rib and then there gushed out two pints and more of hydatids and pus, the finger introduced into the pleural cavity detected a round hole in the dome-shaped diaphragm, doubtless leading into the liver. The history stated that the girl was in perfect health

till one Monday out walking six weeks before we first saw her, she felt a very severe pain in the right side which doubled her up and made her faint, but she rallied and was taken home.

CANCER OF THE LIVER.

A COMMON disease after middle life usually secondary to cancer of the stomach, rectum, gall-bladder and ducts, or some more distant part, *e.g.*, uterus, breast, testes. The liver is enlarged and weighs much more than natural, indeed the heaviest livers on record are cancerous. The duration is seldom more than twelve months.

Severe pain, tenderness over the liver, emaciation and anæmia are the main symptoms. Ascites either from pressure on the portal channels in the liver, or from growth into the portal vein, or from associated chronic peritonitis is very common. Jaundice is not common. As a rule new growths do not cause fever, but cancer of the liver is often attended with slight pyrexia, and so are rapidly growing soft sarcomata in any situation.

In diagnosis the presence of bosses or nodules on an enlarged liver is all important; they may be felt to be umbilicated in the centre. But there are such things as a uniform enlargement of the liver from cancerous infiltration, and cases of contraction of the liver from cancer are on record, therefore a diagnosis is not always possible, and indeed ordinary cirrhosis of the liver may cause as much cachexia, as much pain and ascites, and as much tenderness, with some degree also of the nodulation of the hepatic surface. The age of the patient need not be decisive, and there is no reason at all why a drunkard should not grow cancer in his liver.

JAUNDICE.

Bilirubin is probably derived from hæmoglobin in the process of destruction (hæmatolysis) of the red blood disks which is said to occur in the spleen and in the kidney.

It is doubtful whether bilirubin can be made from hæmoglobin without the hepatic tissue first doing something to it. If not, then plainly, jaundice cannot be hæmatogenous, and must be hepatogenous, because without bilirubin there cannot be jaundice, and there can be no bilirubin if the liver is not acting. However the whole question is still in an unsolved state.

Some say that the bile acids may be a material source of bile pigment. The mechanism of jaundice is in the same unsatisfactory position. Jaundice by suppression signifies that the liver does not excrete its right amount of bile pigment which therefore goes into the hepatic veins and so into the general circulation. Jaundice from obstruction of the biliary passages is a more easily understood affair.

That bile pigment disappears from the blood is obvious, some of it is excreted by the urine, sweat, and saliva, but some probably is decomposed and metamorphosed. It is necessary, therefore, that a certain amount of bile pigment must be in the blood before jaundice is obvious, and this may be either from the absorption into the general circulation of too much bile, or perceptible from insufficient excretion and decomposition of it.

Jaundice is often set down to catarrh of the bile ducts; gall stones may produce it; it frequently complicates some acute specific fevers: yellow fever, relapsing fever, typhus fever; it is very

rare indeed in other acute specific fevers; in basic pneumonia and in pyæmia it is common; also in suppurative pylephlebitis and tuberculosis of the liver; cirrhosis of the liver often exhibits jaundice, not usually marked; acute yellow atrophy, a suppurating hydatid, cancer of the biliary passages, congenital atresia of the bile ducts, simple stricture of the bile duct, are other causes. Icterus neonatorum* is simply the result of changes of the blood in the congested skin of the new born—just as bruises fade into a yellow tint. Fright has been followed by jaundice, *e.g.*, Murchison's soldier. Obviously any pressure on the bile duct in the portal fissure as by a large gland or aneurysm, &c. (*see* Cancer of Pancreas), may cause jaundice.

Symptoms.—The pigmentation of jaundice comes first in the urine, next under the conjunctiva, and a good place to look for it is beneath the sublingual mucous membrane. The colour of the skin and urine varies much, but yellow-brown is a common colour; actually green may be seen. Bilirubin gives a green colour when a few drops of tincture of iodine are added to a test tube full of urine. On porcelain or white blotting paper, Gmelin's test, consisting in a play of colours from green through blue, violet, red and yellow, may be observed about the area of junction of a drop of the urine and a drop of nitric acid.

In doubtful cases, shaking successive large quantities of urine with chloroform so as to dissolve out the bile pigment, is a good method.

Bile acids can only be present in small amount; may be tested for by Pettenkofer's method which consists in placing in a porcelain well (preferably surrounded with ice) a teaspoonful of the bilious urine with a few drops of a solution of glucose or cane sugar, and then adding slowly a few drops of sulphuric acid; the development of a deep pur-

* See Author's *Treatment of Disease in Children.* Lewis.

ple colour at the area of junction of the urine and acid signifies the presence of bile acids.

Evaporation of the urine to a syrupy consistence may cause deposits of leucin, as little globules having concentric markings, and tyrosin, usually in the form of sheaves of needle-like crystals.

Jaundice often causes a slow pulse and very itchy skin; nausea and vomiting are not uncommon; the motions are of a clay colour when jaundice is intense; the temperature tends to be below the normal in simple jaundice. Xanthelasma chiefly of the eyelids has been associated with jaundice.

When jaundice is symptomatic or accompanies another (severe) disease, hæmorrhages everywhere and anywhere, with severe nervous symptoms—coma and convulsions—may occur, just as in malignant fevers (*see* Acute Yellow Atrophy).

Jaundice may be treated by Carlsbad or Vichy waters, or by sulphate of soda in half-drachm doses; carbonate of soda, extract of taraxacum and powdered rhubarb, are other remedies which stimulate the liver to increased effort. This treatment is pursued on the theory that jaundice is due to laziness of the hepatic cells which make but do not turn out the bile pigment.

Exercise may be taken, flannels should be worn, fat, pastry, sweet wines and malts should be prohibited. Warm baths, diuretics and diaphoretics, are also good.

In chronic permanent and complete jaundice, oily foods should be proscribed altogether, and sugary stuffs should be kept low, but if nutrition is to be maintained much other food must be eaten.

Purified ox or pig bile should be ordered in five-grain doses, two hours after meals, in capsules or pills coated with a solution of tolu in ether, so that the mass may escape the solvent action of the gastric juice.

Itching may be relieved by alkalies and bella-

donna, and locally by alkaline baths, and a lotion composed of a drachm each of borax, carbonate of soda, and prussic acid to the quart of water. Flatulence may be mitigated by charcoal biscuits, ginger, turpentine, creasote.

GALL STONES.

Cholesterine may be almost the only constituent of a gall stone, or bile pigments may nearly compose the whole, but generally both are present in the same specimen. The lighter in weight, the lighter in colour, the more crystalline, the more concentric and radiate on section, the more cholesterine is there in their composition. Sometimes the concretions are innumerable, very small, and look like black grits of altered bile pigment. Frequently a large number have rubbed together in the gall bladder and then present smooth flat surfaces (facets) bounded by rounded or sharp angles; often such resemble a chocolate cream, having a hardish crust with a soft body.

Solitary gall stones often consist almost entirely of cholesterine, and may be as large as a walnut, smooth or tubercular on the surface, pale-lemon in in tint or any shade of brown.

Mucus often forms the nucleus round which the lime salts, pigment and cholesterine get deposited. When dry the stones sink in water, often they do not when freshly passed; rubbed between the fingers they feel greasy or soapy.

Occurring at any age and in either sex, they are most common in females beyond middle life, especially in those who pursue sedentary habits and put on fat.

The gall bladder may form a distended tumour, innumerable calculi being contained therein, and

a grating sensation or soft crepitus may be felt on manipulation; the axis of the distended gall bladder passes "down and out" as a rule, and its situation is about the level of the ninth rib. Pain, tenderness, and fever, may or may not develop with the signs of suppuration, and this abscess may burst in many directions; or it may be opened by operation from the surface. Or a bile stone may block the common bile duct and cause jaundice, or passing with difficulty along the duct it may cause **hepatic colic,** which is characterised by exceedingly severe pain of sudden onset about the right hypochondrium. This pain may encircle the right side and it may radiate, usually upwards, whereas in renal colic the pain usually radiates downwards.

The pain lasts few or many hours and may be attended with signs of collapse; vomiting, fainting and sweating may occur as in the other named colics. Hepatic colic is generally relieved by firm pressure and usually sets in suddenly two hours or so after a meal, when it is supposed that the gall bladder contracts in order to pour bile into the duodenum in response to the stimulation of this part by the chyme discharged from the pylorus. The colic ends suddenly as a rule by the slipping of the gripped stone either back into the gall bladder or into the duodenum. If jaundice arise, this usually happens about thirty-six hours after the onset of colic. Murchison showed that a remittent or even intermittent fever was prone to attend cases of serious obstruction of the bile ducts, this has been set down to the lighting up of inflammation of the biliary tubes.

It will be understood that even severe gallstone colic need not cause jaundice because the impediment to the flow of bile might not be complete, and if the impediment is complete jaundice probably does not follow unless the obstruction lasts

long enough. A gall stone should be sought for in the stools by macerating them and then straining them through a sieve.

Gall stones may ulcerate from the gall bladder into the duodenum and may lead to a severe form of obstruction of the bowels; they may perforate into the hepatic flexure of the colon. The seat of perforation may be the umbilicus or even the vagina. Since the cystic duct may be obliterated bile may not be present, and that the abscess or cyst is the gall bladder may only be discovered by the finding of a gall stone in the discharge.

Placing the patient in a hot bath, if she is not too bulky, and injecting a quarter of a grain of acetate of morphia under the skin are the best remedies for a severe attack of hepatic colic; the injection may require frequent repetition. If vomiting does not prevent, half a grain of extract of belladonna and a grain of opium may be given and repeated till marked relief follows. Anæsthetisation with chloroform has been frequently practised also. Hot fomentations, ice-bags and chloroform liniments form local applications. Ice, effervescing draughts and dilute prussic acid may stave off the vomiting.

To prevent the formation of gall stones the best remedy is, as for renal calculus, large doses (more than a quart a day) of distilled or salutaris water. The diet should be light and include fresh succulent fruits; gluttony and sedentary habits should be cried down; spirits, salads, spices and asparagus ought also to be avoided.

A mixture of sulphuric ether—twenty minims—and spirits of turpentine—five minims—in the compound almond mixture three times a day is very nasty and not at all efficacious; chloroform, ether and turpentine are prescribed on the theory that they dissolve the gall stones.

Hot water with bicarbonate of soda, half a

drachm to the pint, is useful to relieve the attack and also if repeated every morning to prevent the formation of gall stones.

Section XI.

DISEASES OF THE BLOOD.

ANÆMIA.

Anæmia, like chorea, may be the only essential symptom, all other phenomena being due to the state of the blood, and some of these cases for which a definite cause cannot be discovered, are assumed to be dependent on some derangement of the blood-making or blood-destroying tissues and are named "idiopathic anæmia."

This affection, most common in females from puberty to twenty-five years of age, may occur at any time of life and in either sex. Especially during the middle periods of life it is apt to assume a seriously progressive character, not being amenable to any sort of treatment, and then the phrase "pernicious anæmia" is employed.

In all these cases, whether curable or incurable, the main defect in the blood is a diminution in the amount of its colouring matter; generally attended by a diminution in the number of red blood disks; sometimes the diminution in number of the disks is proportional to the diminution in quantity of hæmoglobin, each corpuscle having its proper amount of colouring matter; but often each blood disc has less pigment than normal. The blood is

too watery—hydræmia—but the other solid constituents are not necessarily affected; occasionally there is hypinosis or deficient tendency to coagulate. Sometimes young women have a peculiar pallor or greenish tint, hence the term chlorosis or green sickness. Spanæmia and oligæmia are other terms used to signify the poverty of the blood. There is no real excess of white corpuscles.

Of course anæmia may be due to many exhausting diseases such as fevers, especially rheumatic fever, cancer, phthisis, or it may arise from actual bleedings from various regions, and from disease of the stomach and liver. The source of the bleeding is not always obvious, and in all cases of doubt the rectum and other hidden passages should be investigated.

A curious waxy pallor of the face, a pale conjunctiva, a tendency to transient œdema of the eyelids and malleolar regions without fever are the chief external signs, whilst a venous hum may be heard over the jugular veins, a systolic murmur over the pulmonary artery, at the left apex of the heart and even at the aortic cartilage. These murmurs are chiefly due to the low specific gravity of the blood causing this fluid to vibrate more readily than natural, just as ether when shaken vibrates more and longer than water. They may also be explained on the theory that murmurs are invariably due to the production of "fluid veins" by the passage of blood through a narrow orifice into a wider region beyond. Shortness of breath on exertion is naturally a prominent symptom, and the heart may palpitate. All the organs and functions of the body are disturbed from the poorness of the supply of blood, and nervous symptoms in the form of faintness, giddiness, noises in the ears, flashes of light before the eyes and neuralgic pains are common. Constipation is the rule, and the term fæcal anæmia involves a theory that the

anæmia is dependent on the constipation; it being believed that absorption of deleterious matters from the undischarged fæces spoils the blood-making processes.

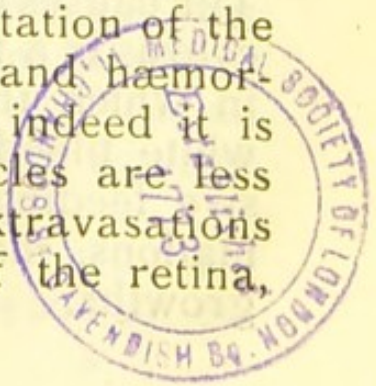
Fever may occur in severe cases, especially in the pernicious forms, and is of the same irregular type found in leucocythæmia. Patients feel the cold much as a rule and their spirits are low. The fat is usually retained so that emaciation is not a symptom. Neither is there any albuminuria in the majority of cases. As there is a deficiency in the hæmoglobin, so the bile pigment is insufficient and the stools rather pale, and the urine also is often very pale.

In many cases the anæmia is largely due to overwork, bad food, and want of pure air, as in sempstresses and work girls.

When no organic cause, such as syphilis, metallic poisoning or any of the usual causes of anæmia, can be found, a free saline purge and the administration of one of the astringent preparations of iron usually soon effect an improvement; it is essential to secure a daily action of the bowels.

Healthy living, pure air and good fresh (not salty or preserved) food are useful. When iron in any form fails arsenic often succeeds. The compound aloes pill with iron is also a serviceable preparation.

The amenorrhœa of young women is usually the consequence of the anæmia. Virchow attributed these cases in young women to congenital narrowing of the aorta. A tendency to dilatation of the heart always exists in severe cases, and hæmorrhages into the retina are frequent, indeed it is asserted that when the blood corpuscles are less than thirty per cent. flame-shaped extravasations of blood, in the nerve-fibre layer of the retina, always occur.



Fatty degeneration of the viscera and especially of the heart, "tabby-cat striation," also arises in severe cases.

The normal rapid rate of growth of the heart during puberty doubtless predisposes to the cardiac dilatation.

Here may be stated a few remarks about **complexion** as a sign of disease. Anæmia makes the face pale and somewhat translucent or waxy. Myxœdema causes a puffy, opaque white face often with red cheeks. Bright's disease in its epithelial varieties, especially the large white kidney, generally produces a pale, puffy and opaque (pasty) face. Lead poisoning often exhibits a muddy, opaque and sallow complexion. Syphilis an earthy sallow tint with some pallor. A large spleen—lienosis—may be associated with a white and faded box-leaf tint of face. The cancerous cachexia often causes a mixture of whiteness, sallowness and opacity. Cyanosis makes the nose clubbed and the ears and cheeks blue or of a dusky leaden tint. Alcoholism, cirrhosis of the liver and exposure to cold air are often attended with large venules on the nose and cheeks with points and striæ (stigmata) of dilated capillaries. Jaundice and silver poisoning (argyria) may often be diagnosed by simply looking at the face.

LYMPHADENOMA AND LEUCOCYTHÆMIA.

The causes of leucocythæmia are unknown. Leucocytosis is a term given to that condition of blood in which there is a temporary slight excess of white blood corpuscles, and it occurs after excessive feeding and in fevers, suppurations, inflammations, malaria and with rapidly growing new growths.

Splenic leucocythæmia is a term signifying that the spleen is enlarged from excess of lymphoid tissue and that the blood is surcharged with leucocytes.

The overgrowth of lymphoid tissue may occur alone—lymphadenoma—Hodgkin's disease. It may be universal in all the lymphatic tissues of the body, glands, serous and mucous membranes, marrow of the bones, spleen and other viscera, or the glands near the surface of the body only may be affected—as is the rule in Hodgkin's disease. Anæmia lymphatica and Adénie are synonyms.

Malaria and menstrual disorders are sometimes causative according to Gowers.

The glandular enlargements are mostly painless and gradually increase, seldom by leaps and bounds, rarely indeed with inflammatory signs. The neck and axilla are common first sites; all the other regions may be simultaneously involved. Mediastinal growths may cause their usual symptoms.

Anæmia increases, strength diminishes, irregular fever tends to appear, but the wasting is often not noteworthy, and fat is generally retained as in simple anæmia.

Arsenic, iron, wet packing and careful dieting, as in pernicious anæmia, are the best remedial measures.

HÆMOPHILY.

Bleeders are nearly always of the male sex, but the disease is derived from the sisters (of bleeders) who do not, however, suffer themselves. It is an hereditary disease therefore, but whether actually present at birth (congenital) is doubtful.

The symptom is the symptom of purpura—hæmorrhages—which may be spontaneous or ex-

cited by injury, drawing a tooth, vaccination, a cut with a knife, &c. Purpura is a mere incident in the life of an individual, whereas hæmophily is the sufferer's constant possession. Hæmorrhages occur into the subcutaneous tissues, into the joints especially the knees, and onto the surfaces of the various mucous membranes, in fact they may occur as in purpura, anywhere.

Direct pressure on the bleeding part is the best treatment of traumatic cases; tincture of the perchloride of iron and absolute rest with an ice-bag over the supposed seat of hæmorrhage, of the spontaneous cases. Prevention is more important than cure.

DISEASES OF THE SPLEEN.

Diseases of the spleen still more than those of the liver and lymphatics are "deuteropathic" or secondary to, or parts of, morbid processes elsewhere. All fevers tend to congest the spleen, probably by paralysing its muscular tissue, so that after death the organ is soft and swollen; typhoid fever causes more enlargement than other acute specific fevers. In tuberculosis there may be miliary tubercles on the surface and in the substance of the spleen; in chronic tubercle occasionally the spleen presents several large crude or caseous tubercles, and the section may be like "hardbake," but the islands corresponding to the almonds having the yellow colour of caseous tubercle. "Ague cake" is a hard and large spleen, often much pigmented. The "sago spleen" is due to lardaceous disease affecting chiefly the Malpighian bodies; the spleen may be more diffusely affected with lardaceous or waxy disease.

Though comparing with the liver in much of its pathology, yet the spleen differs in the infrequency

of large solitary abscesses and such affections as chronic atrophic cirrhosis. Its intimate relations appear to be with organs concerned with blood making or destroying processes, as bear witness its alterations in acute fevers, in all sorts of chronic anæmia, and in its being diseased side by side with such viscera as the thymus, marrow of the bones and lymphatic tissues of the intestines, and also the lymph glands; in this connexion also may be noted the relatively large size of the spleen, of the lymphatic tissues, the tonsils, the thymus, the marrow of the bones and the liver in infancy; at puberty these tissues tend to sink in importance and decrease in size, whilst the circulatory, nervous and genital systems come to the front and exhibit greater activity.

In passive congestion from heart disease, the spleen like other organs becomes hardened but not enlarged; if the liver is the seat of cirrhosis, hardening of the spleen occurs with enlargement, provided that this is not mechanically prevented by thickening of the capsule of the spleen—by chronic perisplenitis which is analogous to perihepatitis. Syphilis and alcohol are probable causes of this perisplenitis; gummata may scar the spleen and look like the remains of an embolic infarct, but the syphilitic scar is stellate. Infarcts are very common in the spleen, also of course metastatic abscesses in pyæmia. If the spleen is enlarged and tender, and there is a cardiac murmur with or without fever, ulcerative endocarditis is highly probable. It is doubtful whether rickets enlarges the spleen, but congenital syphilis certainly does.

Cancer and hydatids are not common in the spleen. In blood diseases of chronic sort and not necessarily febrile: anæmia lymphatica (Hodgkin's disease), lienosis or splenic cachexia, leukæmia, the spleen is enlarged apparently from pure hyperplasia.

THE TESTES.

The testes are of medical importance chiefly as pointing to the nature of disease elsewhere, and thus they are like the liver and spleen, being indeed migrated abdominal organs.

Tubercle may affect the epididymis and this may throw light on the nature of pyuria and hæmaturia. Tubercular disease may involve also the prostate and vesiculæ seminales. Doubtful syphilis elsewhere may be confirmed by the discovery of a syphilitic sarcocele. The lumbar glands may be the seat of cancer secondary to testicular cancer.

DISEASES OF THE PANCREAS.

The head of the pancreas is a common seat of cancer which undoubtedly begins in the epithelial lining of the pancreatic duct or duodenum or common bile duct, and it is the liver tubes that supply its most obvious clinical signs, which are ascites and jaundice; in any individual the combination of well-marked ascites and jaundice is highly suggestive of this disease. But the same symptoms occur when cancer commences at other near parts as the pylorus or the gall bladder, the bile ducts act as good conductors of cancer, and thus the portal fissure and the branches of Glisson's capsule may be overrun by the cancer elements which these structures seem so apt to convey.

A tumour may be felt to pulsate from its lying over the aorta, and pain may be complained of, deep-seated or referred to the umbilical region.

Calculi of phosphate of lime may obstruct the canal of Wirsung, and lead to cystic enlargement.

Fatty matter in excess in the stools is given as a point in the diagnosis of pancreatic disease.

The pancreas is frequently cirrhosed in chronic heart and lung disease just as the liver and kidney may be, it is often hard also in diabetes.

Pancreatic bubo like parotid bubo has occurred in connection with typhoid fever.

Lymphosarcoma affects the pancreas occasionally and miliary tubercles extremely rarely, as in a case recorded by Dr. T. Barlow. An appearance as of a crude tubercle in the pancreatic gland is common, but careful inspection shows that as in the case of cheesy bronchial gland and lung, the cheesy gland has simply pushed its way between the lobules of the pancreas.

ADDISON'S DISEASE.

ADDISON'S DISEASE has been found in all its symptoms even when tubercular disease of the suprarenal capsules has not been present, but merely when they have been atrophied and their nerves involved in a cicatricial mass; by many this disease is believed to be due to involvement of the solar plexus. But in most cases the glands have been destroyed by a somewhat peculiar tuberculosis in which the supporting tissue or meshwork is very thick and fibroid. Caries of the spine has gone with this change sometimes, and sometimes there is evidence of tubercle in the lymphatic glands or lungs.

Pain about the back and epigastrium, nausea and vomiting often suggest gastric ulcer. The asthenia and cardiac debility is most pronounced, and overshadows the anæmia, whilst emaciation is seldom extreme, and often as in simple anæmia the fat is retained. Bronzing of the skin and pigmentation of the mucous membranes make the

patient look like a negro, and this coloration is most evident around moles, scars, &c., in the axillæ, about the areolæ of the nipples, the groins and genitals, also on the exposed parts of the face and arms. The margin of the eyelids, and occasionally the junction of the cornea and conjunctiva are pigmented, indeed, the junction of mucous membrane and skin is a favourite site. Occasionally jaundice is suggested by this pigmentation, but the sublingual and subconjunctival tissues are pale and show no sign of bilirubin. Death most commonly is the termination, and by sheer exhaustion of the nervous energy, chiefly of the heart. The supra-renals generally show areas of caseation with fibroid signs and puckering. Cancer of these organs does not appear to cause Addison's disease; sarcoma of these glands, however, may be attended in infants with remarkable overgrowth of hair and development of the external genitals. Woollen clothing, rest in bed or armchair, carriage or bath chair exercise, nourishing digestible diet, malt, iron wine, and cod-liver oil constitute the treatment.

Section XII.

DISEASES OF THE URINARY SYSTEM.

THE URINE.

The specific gravity of a specimen of the total urine passed in twenty-four hours is in health about 1020. Free drinking makes the urine abundant, pale, watery, and of a low specific gravity. Diminished intake of water or excessive sweating

causes the flow to be scanty, high coloured, and of high density. Fifty ounces is about the normal discharge per diem in health. As to urea, the principal nitrogenous constituent of this fluid, the average discharge of it per diem is three grains for every pound of body weight. For every part of proteid taken as food, one-third is eliminated as urea. Ranke's *Diet for an average working man* states that 100 grammes of proteids are required in twenty-four hours, and therefore 33 grammes of urea would be yielded, which is about 450 grains, a result which is found to agree nearly with the urea normally discharged by such an individual. Supposing the body weight to be 150 pounds, this agrees also with the rate above mentioned of three grains per pound of body weight.

Normally the urine of twenty-four hours is acid, but it is doubtful whether this is due to acid phosphate of sodium. The taking of food especially in large quantities depresses the acidity of the urine, and if the urine be collected directly from the ureters, it would be found to be neutral or even alkaline about three hours after the principal meal. Urine passed an hour or so after meals is often cloudy from phosphates, and these are precipitated simply because of the diminished acidity of this fluid. The "alkaline tide" of the urine is due not to the pouring out of acid gastric juice, but to the absorption of citrates, tartrates, and malates from the food; this is proved partly by the circumstance that it is rather when the gastric processes are falling off work that the alkaline tide sets in and partly by the fact that vegetable foods and fruits, which are richest in the above-named salts, cause a greater effect in depressing the urinary acidity than does a mere meat diet. Vegetarians and herbivorous animals normally pass alkaline urine. The author has collected evidence tending to show that the sweat also

exhibits an "alkaline tide." Repeated vomiting and regular washing out of the stomach both cause the urine to be alkaline, doubtless because of the removal of so much acid from the body. A flesh diet increases the urinary acidity, and fasting also, but there is a limit to this.

Uric acid is present in healthy urine in the form of urates, and about eight grains a day is the quantity discharged. Uric acid in the form of crystals, often lozenge shaped and single or clustered into lumps, may be spontaneously deposited when the urine is highly acid. Urates and uric acid have a great liking for the colouring matter of the urine; phosphates do not attract the colouring matter at all, they are most common in pale urines which are alkaline, neutral, or only slightly acid. Chloride of sodium is passed in large quantities in health. The chlorides in the urine are much diminished in acute pneumonia and in other fevers, and in inflammations to a less extent.

Sodium calcium and magnesian phosphates, sodic and potassic chlorides and sulphates are other salts found in urine. Besides there are other bodies: hippuric acid, creatin, creatinine, allied to uric acid and urea.

Urates are dissolved by alkalies and heat, phosphates by even weak acids and cold. Urates may be white, fawn-coloured, brown or purplish; uric acid crystals, red or orange red, and by these signs they are known. Oxalate of lime exists as octahedra (envelope shaped) or dumb-bells or spherules, they do not dissolve in alkalies nor acetic acid, but only in strong mineral acids.

The acidity of healthy urine was said to increase slowly for some hours after being passed (acid fermentation); then in two days or more it does undoubtedly become alkaline and ammoniacal from decomposition of the urea into ammonic carbonate by the agency of the micrococcus ureæ

found in the mucus; an amorphous granular deposit of tricalcic phosphate (bone earth), spherules of urate of ammonia and "coffin-lid" crystals of triple ammonio-magnesian phosphate then result.

A little cloud of **mucus** is often seen in normal urine; it is precipitated by acetic and citric acids, but dissolves in liquor potassæ. Pus is not present in healthy urine, it becomes glutinous on the addition of liquor potassæ or other alkali; this is the cause of the "ropy" pus (misnamed mucus) of ammoniacal urine—generally mucus and pus are present together as in chronic cystitis. In vesical inflammation the ammoniacal change may occur in the bladder before the urine is passed, generally, however, only after a catheter has been used; it is supposed that the catheter has carried in the germs which set up the putrefactive ammoniacal alterations in the urine.

Pus cells can be detected by the microscope, boiling does not cause a precipitate of pus to disappear, and with pyuria a precipitate of albumen is always thrown down on boiling; the amount of albumen present is not great and is proportional to the amount of pus present in the boiled specimen; this is often difficult to determine, though it is important, since we require to know whether the kidneys are diseased as well as the urinary tracts.

The urine is rarely ammoniacal when leaving the kidneys, this change only occurs in severe illnesses (advanced Bright's disease) and but little is known of it; many of us doubt its existence. When alkaline from a fixed soda or potash base the urine is very aromatic, this is the form of alkalinity that is met with in most alkaline urines which have not undergone putrefaction.

Extraneous matters of various kinds are found in the urine. Cotton fibres have the appearance of flat limp twisted bands with longitudinal mark-

ings, and they vary in width from the diameter of a red blood corpuscle to three times this breadth; or they may be like narrow glassy cylinders.

Woollen hairs look like hard cylinders with transverse markings and slightly serrated margins. Flax fibres often show a "greenstick" fracture, are jointed, and their ends fibrillated. All these have a well-defined outline and are very long, in both which respects they contrast with urinary tube-casts.

Hairs, oil globules, starch granules, torulæ, bacteria, epithelia from sputa, fæcal matters, soot, sand and other kinds of dirt may be accidental impurities. Vegetal tissue or striated muscle fibres in the urine must be derived from a fistulous connection between urinary and intestinal tracts.

Urines of low specific gravity soon decompose, and without this may cause effacement of organic constituents; in such urines red blood corpuscles, renal epithelia and casts often disappear after the urine has been standing some time, but pus, pavement epithelium, as from the vagina, and spermatozoa resist much longer the effacing action of watery urines; however, there is no better preservative of red blood disks than a urine of about the normal specific gravity.

Turpentine taken internally gives the urine a smell of violets; cubebs and copaiba, asparagus and garlic impart peculiar odours to the urine.

The **pigments** of the urine are ill understood. Indican is often present in large amount in intestinal obstruction and ulceration and in granular kidney, but its presence is of not any diagnostic value. The best test is half an inch of hydrochloric acid in a test tube, into this drop a few drops of urine and add one drop of nitric acid, a violet-blue colour of indigo blue slowly develops if indican be present.

Melanin in black particles has been secreted by

the kidneys in cases of melanotic disease of the skin and viscera.

A pale urine may become dark after being passed, this being due to pyrocatechin—a body allied to phenol, these "alkapton" urines may be rendered black by the addition of caustic alkali.

Salicylates and salol colour the urine darkish green, and may be detected also by the use of a few drops of ferric perchloride which develops a purplish colour. Wounds dressed with carbolic acid spray often cause the urine to become black, and this increases on exposure to the atmosphere; hydrochinon is derived by oxidation from phenol, it is passed as a colourless sulphate which decomposes and absorbs oxygen from the atmosphere and thus is the source of the black pigment. Senna, logwood, santonin and rhubarb taken internally alter the colour of the urine to various shades of red and yellow, alkalies added to these urines deepen their colour.

Iodides taken internally are excreted by the urine, and may be detected therein by Heller's test with cold strong acid; half an inch of nitric acid is poured into a test tube, and onto it is gently poured a similar quantity of the urine, at the junction area there develops a brown-black ring of iodine and this gives with starch the characteristic dark blue colour.

The presence of iodide in the urine also causes the tincture of guaiacum to yield a blue colour in the presence of ozonic ether as in the test for hæmoglobin. Pus and saliva in the urine give a similar reaction; so that the guaiacum test for blood in the urine is highly fallacious

A word to exhort students to become well acquainted with the microscopic characters of urinary deposits (and stools) may not be out of place.

A deposit of stellar phosphates ($CaHPO_4+2Aq$) composed of rods or needles grouped in star-

shaped clumps or more rarely isolated may be seen in some neutral or alkaline urines; it has usually been associated with rather serious diseases—diabetes, pyloric cancer and exhausting phthisis and chronic rheumatism; richness of the urine in lime and depression of its acidity without the presence of ammonia are the least elements required for the making of these crystals. Rarely plates looking like "cover slips" with broken ends (as used in microscopic work) may be found in similar urines, their composition is represented $Mg_3 (PO_4)_2$. Escape of carbonic acid causes phosphates to be precipitated as an iridescent film on the surface of the urine.

The "milky" urine of febrile children contains urates, and these may assume the "hedgehog" or "thorn apple" shape found in decomposed urine.

ALBUMINURIA.

The presence of albumen in the urine is not sufficient to prove the existence of renal disease. Casts of the urinary tubules and soft ill-defined nucleated granular renal cells in the urine constitute better evidence of kidney derangement, yet too much must not be expected of them in diagnosis, because they are often present when the kidney mischief is slight and transient, also when other viscera than the kidney are most diseased.

Pus and blood give albuminuria because of their *liquor puris* and *sanguinis*. Any lesion, however slight or severe, of the renal protoplasm, vessels, or nerves, may cause albuminuria, likewise any poisoning of the blood flowing through the renal circulation.

HÆMATURIA.

Blood may also appear in the urine from any disease of any part of the urinary tract. When from the kidney the blood is apt to be intimately mixed with the urine, which has a darkish, "smoky" colour and deposits a brownish sediment. A brownish tint is due to the acid turning hæmoglobin into acid hæmatin as in gastric bleeding, but the passage of much blood soon alkalinises the urine. The presence of blood casts is conclusive proof of bleeding into the renal tubes, but of nothing more, it does not mean that there is acute inflammation, because mere congestion, as in heart disease, will make blood casts of the renal tubes. Surgical works and common sense supply information as to the site of the bleeding. Blood disks should be found by the microscope before it is asserted that actual hæmaturia exists, because in hæmatinuria the appearances of the urine to the naked eye are the same, though a definite blood corpuscle is seldom present. Sometimes the quantity of blood passed is so large and free that it looks like pure blood and may clot in the bladder just as in chyluria.

Spheres of oxalate of lime, nuclei of renal epithelium and compressed spirilla (Beale) may be mistaken for blood disks, which in urine are also prone to be crenate or "cottage loaf" shaped with the hæmoglobin extruded. The presence of hæmoglobin is best shown by the spectroscope, because the guaiacum test is fallacious, and so is Heller's test, which consists in the boiling of the urine made alkaline by potash, the precipitated phosphates take down with them the colouring matter in the urine; unfortunately by this treatment the phosphates are forced to become pigmented

with whatever pigment happens to be present, so that a very dark urine or one containing senna, rhubarb, santonin, may produce the pigmented precipitate, the colour of which, even when blood is present, is not always pink. When bloody urine is alkaline, a curious pink or red hue obtains as in so many bladder cases.

The commonest cause of hæmaturia in medical practice is gravel or calculus, especially in children, and in the absence of other symptoms this diagnosis is very seldom at fault.

Acute nephritis, tubercular pyelitis, malignant growths are common causes also. Very smart hæmaturia is generally due to calculus or malignant growths, especially villous tumours of the bladder, the former causes more pain as a rule than the latter. Any jolting of the body is liable to cause hæmaturia when stone is present either in the bladder or renal pelvis; this effect is not usually noted with new growths, but new growth and calculus may be associated as in cancer of the gall bladder.

The correct treatment of hæmaturia is perfect rest in bed with light nourishing diet, ice-bag over the assumed seat of hæmorrhage, and the prescription of any of the usual styptics, which however, are not very efficacious. Further hæmaturia seldom kills directly, though much chronic anæmia often results.

Emboli in the kidney arteries may cause hæmaturia, metastatic abscesses result if the plug is infective; in pyæmia and ulcerative endocarditis these may be overlooked during life unless the prostration of the patient has not proceeded very far. Thrombosis of renal veins sometimes complicates lardaceous and other chronic forms of nephritis.

PARASITIC HÆMATURIA.

Parasitic hæmaturia is common in the boys of Natal, and is due to the ravages of the Bilharzia hæmatobia; the blood usually comes from the bladder and is therefore passed most abundantly at the end of micturition. The ova may be found in the urine as oval bodies, with a spur at one end, $\frac{1}{150}$ inch in length; the lively ciliated embryo may be seen to have escaped by rupture of the chitinous shell. Santonin has been given internally in two grain doses, also liquid extract of male fern (mxv.), and turpentine ʒ ss. Injections of solution of iodide of potassium gr. v. to ℥ i., or saturated solution of santonin in alcohol ʒ i., liquid extract of male fern ʒ i. to ℥ i. of thin barley water. Slight cystitis is caused by these injections, but it soon subsides under the influence of bland drinks, infusion of buchu and juice of hyoscyamus.

CONGESTION OF KIDNEY AND ALBUMINURIA.

Pressure on the renal veins by a pregnant uterus, or tumour, or ascites, may cause venous renal congestion and slight albuminuria, so also may thrombosis of the vena cava inferior. Chronic venous congestion also results from valvular disease of the heart and from dilatation of the right ventricle in emphysema, bronchitis, and extensive lung disease. The urine is usually scanty, high-coloured, apt to deposit purplish urates, and may present blood pigment, renal epithelium, and casts. The kidney too at the

necropsy is found hard, but usually smooth on the surface.

All fevers are said to congest the kidneys, but on doubtful evidence; slight albuminuria is often, not always, seen in them, and different fevers present different liability to this "pyrexial" albuminuria; diphtheria, pneumonia, scarlet fever frequently exhibit it, but in these a true nephritis may arise. The truth is that we are not yet in a position to state what is the essential proximate cause of albumen in the urine, it may be met with in such a variety of circumstances, but perhaps it may be the spoiling of the function and nutrition of the glomerular epithelium which is the mechanism through which every cause of albuminuria must finally act. Now in order to maintain this epithelium in a state of health, probably the blood, blood pressure, nervous influences and other physiological factors must be of a given kind and a given intensity, yet it is strange that albuminuria does not occur in all forms of ill-health, and it would seem that the morbid conditions of blood and body on which its *absence* depends are fairly numerous.

Excessive consumption of albumens and even of other food, cold bathing and muscular exercise increase any albuminuria that may be present, and the same may cause albuminuria.

A form of paroxysmal albuminuria is described as having the same symptoms as paroxysmal hæmoglobinuria.

Physiological albuminuria is said to exist when the only sign of kidney disease is albuminuria, the patients being in good health would not know of their albuminuria if it were not for the doctor; other cases of this so-called cyclic albuminuria are distinctly associated with feeble health, anæmia, mental anxiety, nervous debility, and though the albuminuria disappears it is questionable whether some of the cases, if left untreated or if the cause

was not removed, would not have drifted on to serious disease. In this connection be it remembered that the causation of some forms of chronic Bright's disease are not known.

TESTS FOR ALBUMEN AND SUGAR.

THE urine must be clear and acid before testing for albumen; fine filter paper and weak—acetic or citric—acid are used for these purposes.

A narrow test tube, two-thirds filled with the clear acid urine, is heated so that the upper inch of the urine is boiled; if albumen is present a cloud of opaque coagulum appears in the heated area; it is well to add one drop of nitric acid to this because the precipitate may be phosphatic, if so the acid at once dissolves it.

To ascertain the quantity of albumen passed in twenty-four hours is not of much clinical importance; the specimen used must be a portion of the whole twenty-four hours' urine; a test tube full of this is boiled and set aside till all precipitate is deposited when the amount of albumen present is expressed in such terms as "nearly solid," one half, one third, one fourth, a "trace" and so forth.

Roberts' dilution method is also in vogue. It consists in diluting the urine with water till it gives a reaction with nitric acid only after waiting half a minute. The number of grains of albumen per fluid ounce of urine may be calculated by multiplying the figure ·0034 by the number of dilutions with an equal bulk of water that had been practised. Even when the urine is solid when boiled the amount of albumen present does not go beyond five per cent. of the urine.

The cold nitric acid test (see p. 267) yields a precipitate of albumen at the area of junction

between the two fluids; nitrate of urea may be formed there and is recognised by its crystalline appearance; copaiba resin develops at the same site if the urine contains it; many pigments form there too; urates are thrown down in the upper parts of the urine first, as a dense cloud which disappears on heating—altogether the test is not nearly so good or so sensitive as the boiling method.

In testing for sugar with Fehling's solution the albumen must be separated if present, and the urine must be free from turbidity. The Fehling's solution must not reduce itself on boiling, when it is boiling a few drops of urine should be let in from a pipette, and if glycosuria exist a precipitate of yellowish-red cuprous oxide develops. The urine must never be in excess of the Fehling's solution. When present in small amount a green colour results, this often deposits the yellow oxide if set aside for a few minutes. Glucose in excess dissolves the cuprous oxide, and a concentrated urine has the power of decolorising the copper solution; these facts must be remembered.

For the determination of the quantity of sugar passed every day Fehling's solution is made of such a strength that 10 c.c. of it has all its colour discharged by ·05 gramme glucose.

Moore's test for sugar consists in boiling together for some time equal parts of the urine and liquor potassæ, the mixture grows gradually darker in colour, and if much sugar is present it becomes brown black. High coloured urine, pus, albumen and phosphates give a dark colour when boiled with caustic potash, especially if the latter contains lead, which it gets from its action on the glass vessel in which it is kept.

Fermentation of the sugar contained in the urine may be set up by placing in it some clean yeast and keeping it at a temperature of 90° F.; alcohol

and carbonic acid are formed and the specific gravity lightens, and in such a fashion that for every loss of one degree of specific gravity it has been estimated that the urine contains one grain of sugar per fluid ounce of urine. Supposing a patient passes 200 ounces of urine in twenty-four hours having a specific gravity of 1040, and after fermentation the density becomes 1025, then the amount of sugar passed would be $15 \times 200 = 3000$ grains, or less than half a pound, which would be a moderately severe case of diabetes.

RENAL CALCULI.

Probably renal stones, like gall stones, generally have a nucleus of some substance different from that which forms the chief body of the stone. It is doubtful whether "gravel or sand" of uric acid can be aggregated together to make a stone; a nucleus of mucus, or renal casts or cells, or blood or pus, attracts uric acid, hedgehog crystals of urate of soda, or dumb-bells of oxalate of lime, and then the stone grows by accretion. Stones are sometimes numerous, and often laminated, concentric and radiate on section. These characters should be compared with those of gall stones.

Uric acid calculi are the commonest, but even these are seldom pure. In children soft boggy masses of sand composed of urate of soda are occasionally found, and in one case of the author's led to death. Oxalate of lime is the basis of the "mulberry" calculus. The "fusible" calculus consists of concretions of triple phosphate, bone earth and urates, as found in putrid urine; by means of the blow-pipe it can be fused into a sort of enamel, whence its name.

Cystin, xanthin, carbonate of lime bone earth and indigo rarely form calculi.

It is probable that crystals assume a spheroid or dumb-bell shape when the mineral composing them is deposited in a colloid medium such as mucus, pus, or renal epithelium and casts.

The symptom of gravel and stone (nephrolithiasis) is pain in the loins (lumbago) often confounded with the myalgia of rheumatism and renal colic (nephralgia). This colic is severe and should be compared with the other colics since it may produce sweating, vomiting and fainting; the pain radiates round the side and *downwards* into the scrotum and thigh, the testicle being often retracted. Frequent desire to make water and sometimes "dysuria" in making it are not uncommon symptoms. Bleeding is a symptom of capital importance (*see* Hæmaturia). The urine may show pus, epithelia, casts, and of course crystals. The causes of renal colic besides stone are clots of blood, bits of new growth and tubercle, and hydatid cysts. If no cause of severe hæmaturia and renal colic is apparent, the strong presumption is that a renal calculus exists, for it must not be overlooked that stone may become encysted after being temporarily dislodged, the temporary dislodgment having been sufficient to cause colic and bleeding by an attempt on the part of the renal pelvis to expel it down the muscular ureter. In children mere gravel may excite severe colic and bleeding and even convulsions. The treatment of renal colic is that of gall stone (*q.v.*). Making the urine alkaline with citrate or acetate of potash and drinking freely of distilled or salutaris water is the best treatment for stone and gravel; but the diet should be regulated, as in gout, and healthy living should be enjoined.

Oxalate of lime cannot be dissolved but the dietetic treatment is most important, pork, pastry, potatoes, peas, sweets, vegetables and rhubarb should be diminished to a minimum. Nephrolitho-

tomy is now an established operation (*see* Erichsen's *Surgery*).

OBSTRUCTIVE ANURIA.

Obstructive anuria or suppression of urine may be due to the impaction of a stone in the ureter of one side, when the other kidney has been destroyed or rendered useless by previous disease, and this may be due to a previous calculus impaction leading to atrophy of the kidney. Hydronephrosis and pyelitis and pyonephrosis are other consequences of renal calculus.

In obstructive suppression of urine a most remarkable freedom from serious symptoms obtains for a week or eight days. Failure of muscular strength and sleeplessness are prominent symptoms at the end of the week; muscular twitchings and contracted pupils are very constant symptoms; there is dyspnœa because of the muscular debility of the respiratory mechanism, the breathing being slow, panting and laboured; a dry mouth and absolute disgust for food with a clear intellect must also be mentioned. There is never any urinous or ammoniacal odour arising from the body either before or after death.

The average duration of life is nine to eleven days.

If water is passed it is pale, of low density and generally has neither albumen nor casts.

Cancer of the uterus or other pelvic disease; bladder disease and urethral stricture are other causes of obstructive suppression.

If due to impaction of calculus, massage of the abdomen with a view to get the calculus back into the pelvis or down into the bladder should be practised with the patient either erect, recumbent or inverted with the head downwards. Disappearance of pain in cases of renal calculus sug-

gests paralysis of the muscular ureter. It has been suggested to open the renal pelvis behind the obstruction if the symptom persists for six days.

URÆMIA.

When the renal functions are inadequate or suppressed by disease of almost any sort; symptoms ascribed to blood poisoning may arise—uræmia. The actual nature of the poison is still undetermined. The first symptom may be very different in different cases, and the mode of grouping of the symptoms is variable, probably dependent on variations in the poison and peculiarities in the individual. One fact has appeared to me to be noteworthy; the severity and early appearance of headache when the patient has abnormal refraction of the eyes. Headache, nausea, vomiting, dimness of sight, drowsiness, muscular twitchings, ankle clonus, suppressed or exaggerated knee-jerk, diarrhœa, convulsions, coma, ammoniacal smell of breath and sweat, are common symptoms which may be curiously fugitive and irregular in time, being apparently related to no special cause. Further, suddenness is a characteristic quality of uræmic symptoms: sudden blindness and even rapid recovery; convulsions and coma may set in with fulminating severity, or the symptoms may commence slowly and deepen in severity till death ensues.

The typhoid state with dry brown tongue, muttering and subsultus, may appear without fever.

The difficulty in diagnosis is mostly in those cases in which the patient (as in granular kidney) from being in his usual state of health suddenly falls down insensible with or without a history of convulsions; or the onset may be rapid, not sudden; in the former case bleeding into the brain or

epilepsy is suggested, in the latter opium poisoning. As a rule in uræmia the temperature is not raised and the pupils are contracted, but either symptom may be absent.

The presence of albumen in the urine does not prove that the unconsciousness was due to uræmia, for hæmorrhage into the brain is common in chronic Bright's disease.

Sweating should be induced by the hot air bath or hot wet pack with a view to eliminating the poison. Jaborandi or pilocarpine is also used. Compound jalap powder is the watery purge most in vogue. When acute nephritis is present dry cupping the loins and hot moist fomentations over this region should be prescribed. Venesection to the extent of fourteen ounces is the only remedy in cases of repeated uræmic convulsions; one severe case under my care lived six months after this venesection.

The urine may be suppressed in collapse from any cause such as perforation into the peritoneum, rupture of aneurysm and as in cholera; or actual disease of the renal tissues may cause anuria as in acute Bright's disease and suppurative nephritis; a reflex effect on the kidney from operations on the urethra may also cause non-obstructive suppression which strongly contrasts with the obstructive form in its rapid termination, death occurring within two days. Hysteria is credited by Charcot with the power of suppressing the secreting functions of the kidney, and yet the patients do not suffer except from vomiting, which is regarded not as uræmic but hysterical, though the vomit contains urea; remembering that Brown Sequard, in animals, was able to suspend metabolism (see p. 18), there seems some reason to believe that hysterical anuria is a possibility.

Hot baths, hot fomentations to the loins, hot gruel enemata are the best remedies for this form of anuria.

PYURIA.

Roughly speaking, the causes are the same as those of hæmaturia, and the two symptoms often concur. When the pyuria is abundant and long lasting, and the urine acid, the most common causes are calculus and tubercular pyelitis; these two processes may be complicated. In some cases of pyelitis the stone may have disappeared by absorption or disintegration.

Slight catarrh of the urinary passages with slight pyuria is not uncommon in typhoid and other acute specific fevers. Abscesses may open into the urinary tract, sometimes an abscess opens on the one side into the renal pelvis, on the other into the intestine.

Gonorrhœa, leucorrhœa and cystitis must be remembered as causes of pyuria. In stricture of the urethra, in a large prostate, and even in other serious conditions, pyuria may be the most common and obvious sign, for though pain and frequent micturition are the usual signs of derangement of any part of the urinary apparatus, yet, just as in lung and stomach disease, these ordinary signs may be lacking.

PYELITIS.

In acute pyelitis such as results from cantharides or turpentine, the mucous membrane looks like red velvet, being red, swollen, ecchymosed and villous, denuded of epithelium, and discharging muco-pus for all the world like the nasal mucous membrane in a common catarrh.

In chronic cases much pigmentation results, causing a gray or slate-coloured appearance with much

toughening of the mucous membrane on which there forms a patchy layer of phosphatic crusting. If the orifice of the ureter becomes plugged by a stone, blood-clot, or other matter, the calyces dilate, the pelvis enlarges, and finally a large sac is formed containing pus—pyonephrosis. This may behave like any other abscess, and may burst or travel in any direction, or it may become inspissated into a more or less cretified putty-like mass.

Rigors may resemble typical attacks of ague as with suppuration elsewhere, and the fever is apt to assume the hectic type with profuse sweatings. The bowels may be irritated, and thus produce frequent defæcation, or the colon may be constricted, and thus cause obstinate constipation. The tumour if large generally causes fulness and bulging, or only tenderness on pressure and rigidity of muscles in the loin. Sudden subsidence of the swelling and slow refilling is very characteristic, and the subsidence may correspond with the passage of large quantities of pus in the urine or with the stool.

The cortex of the kidney if not atrophied from pressure, becomes involved in an interstitial so-called consecutive nephritis. This is a convenient expression for nephritis resulting from disease of the urinary passages; in its clinical characters it mostly resembles the granular contracting kidney. In pyelitis too the capsule and fatty covering of the kidney may become much thickened and indurated. When both kidneys are the seat of calculus or tubercular pyelitis, life is put in jeopardy from uræmia.

When the abscess bursts externally, a perinephric abscess results and often proves a grave occurrence.

Sometimes **perinephric abscess** apparently arises from a chill or injury, for nothing wrong

can be detected in the urine; the pain in these cases often shoots down the thigh along the anterior crural, last dorsal or sciatic nerves, and the thigh is tightly flexed; the pleura may be inflamed by extension, or the abscess may burrow there or elsewhere.

No facts are more certain than those concerning the migrating tendency of abscesses; a kidney or perinephric abscess may discharge through a bronchial fistula just like a hydatid abscess from the liver, or an abscess originating in some other abdominal viscus or in spinal caries, may open into the pelvis of the kidney.

Without the presence of a distinct renal tumour the diagnosis of pyelitis, especially when it complicates the cystitis of an enlarged prostate or urethral stricture, is often impossible.

Rest in bed, free drinking of bland fluids, local hot applications, careful kneading of the belly in certain supposed calculus cases, with opium if necessary to relieve pain, is the medical treatment. In these days of antiseptic surgery, exploration and operation are certainly to be recommended.

The pyelitis complicating constitutional states, *e.g.*, gout, rheumatism, and such specific fevers, requires the same treatment as these causes; tonics and good regulated food.

HYDRONEPHROSIS.

Not always does hydronephrosis result from sudden complete plugging of a ureter. When this happens, the papillæ of the pyramids become flattened and the intervals between them increased and this process of atrophy from inward distension may lead to almost complete disappearance of the true kidney substance, a large sacculated cavity

resulting, in the walls of which may still be seen the remnants of the former papillæ and calyces. This encysted tumour may fill the whole belly causing difficulties in diagnosis from ovarian tumour and even ascites. A spontaneous subsidence or disappearance of the tumour—as in pyonephrosis—is not likely to be met with in any tumour otherwise simulating hydronephrosis.

Hydatid of the kidney and simple renal cyst are other rare causes of renal tumour.

Hydronephrosis may be congenital just as cystic kidneys may be, the ureter or urethra being imperforate or having some imperfection of development. Calculus is the commonest cause of unilateral hydronephrosis, but compression of the ureter about the pelvic brim, or stricture of the ureter, generally from injury, are other rare causes.

The other kidney becomes hypertrophied, but is very liable to disease, and should a calculus form in its pelvis, obstructive suppression may easily result. The urine of hydronephrosis is pale and watery, of low specific gravity, not containing albumen or pus or blood, and often very little urea. Pain in the loin may be entirely absent, and the fluctuating swelling in the loin may be the only sign unless constipation from interference with the colon lying in front of the tumour should result. Kneading of the belly should be carefully practised. Nephrotomy in the loin is probably the best operation, and when the sac has shrunken the advisability of nephrectomy may be discussed.

CHYLURIA.

White milky urine when passed may set into a tremulous "blancmange" looking jelly from the clotting of the fibrin. It has solidified in the bladder. The clot may be transparent when

lymph, not chyle, is admixed with urine. The jelly disintegrates, a fatty layer rising to the top, and a pinkish deposit falling to the bottom of the vessel. Ether dissolves the former. Albumen and a few blood corpuscles may be detected. The affection is often intermittent. That chyle gets into the urine is clear, and there undoubtedly must be distension of some part of the lymphatics, and these burst into some part of the urinary tract. The condition is allied to lymphorrhœa, and one form of elephantiasis and to "lymph scrotum." The aborted ova of the parent filaria sanguinis hominis are the probable obstructing agents in the lymphatics and the embryos have been found in the blood during the night time.

PAROXYSMAL HÆMATINURIA.

This affection might be regarded as Raynaud's disease of the kidney; it is curiously under the control of cold, for exposure in a susceptible individual almost always induces an attack, which comes on with shivering or chills. Aching sensations in the loins, yawning, nausea or vomiting and feeling of malaise precede the passage of a porter-coloured urine which contains no red blood disks, but much granular matter, some granular casts and oxalate of lime crystals. Each successive passage of urine gets lighter and lighter coloured, and all may be well again within a few hours.

Attacks are very frequent in the morning after breakfast; they may be induced by the customary cold bath. During the chilly stage the extremities of the circulation—fingers, toes, even hands and feet, nose, ears—often present remarkable changes of colour; they may be tallowy white (digiti mortui) or pink, red, blue and blue-black, when

the last colour obtains gangrene may occur; it is these associations which make one think that the kidneys may be the seat of similar changes.

Raynaud's disease consists in the sudden development of such "local asphyxia" which is apt to be symmetrical; the pain is often very great, and the disappearance of the blue-black skin very rapid, just as is the disappearance of the hæmatinuria. It will be gathered that the two conditions occur together either simultaneously or successively in the same patient. Children and adults both suffer. As a rule in both affections there is no fever. Raynaud's disease is sometimes called symmetrical gangrene because of the occurrence of actual loss of substance ending in a scar.

The hæmatin in the urine is simply hæmoglobin acted upon by the acid of the urine, but sometimes the amount of hæmoglobin turned out is so great that it gives the spectroscopic test for hæmoglobin or methæmoglobin. It is believed that the essence of the pathogeny is a disintegration of red blood disks or escape of the hæmoglobin from the stroma, perhaps in the circulation at large, perhaps in the kidneys (and liver and spleen) just as in hæmoglobinuria from other causes. Slight jaundice of the face and skin suggests in these individuals that the hæmoglobin dissolved in the blood serum decomposes into bilirubin.

In some cases of peripheral neuritis the extremities become blue-black, and this may persist for days together; since such cases do not occur in paroxysms we cannot be justified in regarding peripheral neuritis as the cause of true Raynaud's disease.

Infants soon after birth may present hæmoglobinuria. Many observations go to show that hæmoglobinæmia accompanies the normal diminution in the number of red blood disks found in the first days of life. The hæmatin is extruded from

the stroma of the corpuscles and stains the blood serum of a pink colour; the colouring matter is then excreted by the kidneys and perhaps by the liver, and partly disintegrated in the blood causing an icteric tint. Many poisons such as chlorate of potash, arseniuretted hydrogen, and some septic poisonings, may cause hæmoglobinuria, and transfusion has also caused it, especially in animals. In severe cases the symptoms are alarming and fatal: rigors, collapse, cyanosis, coma, vomiting and diarrhœa.

The treatment of Raynaud's disease and paroxysmal hæmoglobinuria is to guard against cold and all depressing agencies; that attacks may occur in the absence of any exciting cause should be known. Rest in a warm bed with hot bottles to the loins to relieve pain, and some hot milk is the best treatment of an attack.

In Raynaud's disease the use of massage and galvanism is recommended; they should be practised as in infantile palsy. Quinine and arsenic are valuable, especially if ague seems to have been suffered from.

CYSTITIS.

Cystitis is described in surgical works. It often proves to be the chief cause of death in diseases of the spinal cord, the mischief spreading upwards and producing "consecutive" nephritis or surgical kidney with its minute abscesses. Gout and rheumatism and acute specific fevers are other less serious causes. In bad cases the urine must be kept sweet by washing out the bladder with aseptic precautions; a saturated solution of boric acid or one containing two grains of sulphate of quinine to the ounce are serviceable.

ACUTE BRIGHT'S DISEASE.

This disease should be compared with acute pneumonia. The mode of onset is similarly abrupt with rigors or chills and headache; vomiting and nausea are perhaps more common in nephritis at the onset. The pyrexia is pronounced, with the usual symptoms of fever.

Pains and tenderness across the loins, thick white lingual fur, dry hot skin, dropsy and albuminuria must not be forgotten.

Uræmia (*q.v.*) may appear in any of its modes of manifestation.

The urine is scanty, dark coloured, contains blood casts, much albumen, and is of high specific gravity; the amount of urea discharged during the disease is diminished.

Acute Bright's disease is generally due either to taking cold or to scarlatina; other causes are blood poisonings, including diphtheria and other acute specifics.

It often arises as the result of a chill in the course of any form of chronic disease of the kidney.

As in acute pneumonia the organ is swollen, the process is attended with multiplication of the epithelial elements, there is shedding of the epithelia and of blood, and the organ is much congested. If death occurs at once the distended organ drips blood freely on section; the capsule has been burst as the result of vascular engorgement (case of Dickinson's jockey). The blood is seen later on, when the cortex is pale and swollen, to occupy three sites, viz:—the stellate veins, the Malpighian bodies and the pyramids.

Minute hæmorrhages in the interstitial tissues and in the tubules are almost always seen if death occurs in the acute stage.

The patients are really ill about a week and then convalescence sets in, but the albuminuria may last for months though it usually disappears in a few weeks.

The chief complications, besides uræmia, are pneumonia, œdema of glottis and heart paralysis with œdema of lungs. Inflammations of pleura and peritoneum are less common than with the large white kidney.

Treatment.—The patient must be kept in bed till the illness is past, and ought not to go out of doors till the albuminuria has disappeared. Expectancy whilst guarding the patient from uræmia is the right treatment. Open the bowels, keep the skin acting by vapour baths if necessary, and give plenty of bland fluids: barley water, milk, soda water. No alcohol of any kind, a farinaceous diet, no meat or eggs till full convalescence; and woollen clothing next the skin all over the body.

Œdema of lungs with failing heart must be treated by digitalis and brandy; and sharp saline purges. A few doses of liquor ammoniæ acetatis or citrate of potash during the illness may be given to keep the skin moist. During convalescence the ammonio-citrate of iron and an alkaline gentian mixture may be given.

LARGE WHITE KIDNEY.

This kidney results from acute nephritis or else arises as a chronic nephritis just as we may have a chronic pneumonia; the tubes and epithelial cells are most affected in the early stages, but there is always some thickening of the intertubular tissues and vessels, and this disease of the supporting and vascular structures tends to increase as time elapses, and in the end may have altered

the kidney so much, that it resembles the granular contracting kidney, being no longer large and soft but small and hard.

The epithelia at first opaque and white from proteid granules, soluble in acetic acid, become in parts fatty and soluble in ether, and cause the section and surface of the kidney to exhibit a branny speckling or buff-coloured mottling.

If not attributable to acute disease this chronic affection arises under the influence of ill-defined causes such as frequent exposure to wet and cold, bad living, intemperance, etc., and it would seem that the blood is first altered or poisoned for a long time, and this proves more irritating to the kidneys than to other organs.

A feeling of ill-health with increasing anæmia, and dyspepsia may be long present before anasarca of the eyelids, feet or sacral region appears, and this may be very great and widespread involving the lungs and pleuræ or other serous tissues. Any of the signs of uræmia may exist alone or in combination; a slow pulse of 44 or so may be unattended by headache or vomiting; occasionally the uræmia sets in explosively with convulsions and coma.

Scanty urine, of low specific gravity but highly albuminous, depositing fatty, epithelial and granular casts, is an essential sign of the well-established disease, and the urine is generally pale yellow and turbid. Other kinds of casts are seen with a few blood corpuscles, and there may be crystals of oxalate of lime; the discharge of urea per diem is diminished. The disease is most common in middle-aged women, but men do frequently suffer from it.

Woollen clothing, abstinence from all indigestible articles, and stimulants are to be insisted upon if the patient is not confined to bed. The skin and bowels are to be kept acting by dia-

phoretics, hot air, or vapour baths and hydragogue drugs: liquor ammoniæ acetatis, tincture of acetate of iron, compound jalap powder, elaterium and infusion of jaborandi.

GRANULAR KIDNEY.

A GRADUAL sclerosis or scarring probably originating around the vessels of the kidney causes the kidney to shrink, its cortex to waste, its surface to become granular, and its weight to decrease. In the first stage the surface is smooth but the consistence is already increased from the exudation into or overgrowth of the intertubular tissues. The vital part or secreting structure of the kidneys does not suffer much at first, but is diseased as the result of the interference with the vascular supply. The evidence is now fairly conclusive that there exists a widespread disease of the vessels, causing a sclerosis of the small arteries and capillaries with increase in the size of the muscular coat, possibly from hyperplasia of the plain muscular tissue; probably, however, the internal, middle and external coats of the vessels are the seats of a chronic inflammation which thickens the coats with a material having a hyaline fibroid appearance.

The hyaline appearance is probably not natural but due to the action of the preservative fluids on the tissues.

The kidneys being very vascular organs and depending perhaps even more than other organs on their circulation show the changes most. Still it is wonderful for how long these patients may live without positive signs of renal disease.

Besides the contracting process the kidney epithelia may undergo fatty changes so that a mottling

results, and the prevailing colour may be red or yellow; often a mixed speckling is seen. Cysts and uratic deposits in or between the tubes, are common.

The actual antecedents of this general vascular disease are uncertain, but it has been supposed that a constant high blood pressure due to overwork of the brain or other causes may lead to it, and to the red kidney. That irritation of the cerebral cortex does raise the blood pressure, and that irritation of any sensory nerve has a similar result are physiological contributions deserving attention:—An attempt to elucidate the pathology of chronic disease is better than an entire remaining in ignorance.

Gout or excess of urate of soda in the blood is doubtless an efficient cause of this vaso-renal change.

Alcohol may be operative in causing this sclerosis of the kidney through the intermediation of gout.

Polyuria of usual character, *i.e.*, pale, clear, low specific gravity, with but little albumen, and few casts, is the chief symptom of the disease. Hypertrophy of the heart, high tension pulse with hard arteries, and some albuminuric retinitis may exist unknown to the patient. Apart from uræmia symptoms may exist anywhere, and be of almost any kind. The patient may go first to the oculist because of his eyesight being bad or neuralgia may trouble him in any part of the body, or he may not sleep well, or his digestion may be his tyrant. Loss of strength, flesh and blood (cachexia), generally supervene, but a very Silenus of the red fat plump and heavy-drinking type may succumb suddenly from coma and convulsions of uræmic origin or from apoplexy due to rupture of a cerebral artery.

Dropsy is often slight and even more fleeting

than renal dropsies generally are: as witness the transient scrotal œdema, and that of the eyelids.

An anti-gouty diet and relief from worry and overwork of brain are preventive measures. Other measures are like those for large white kidneys; a sea-voyage, and a warm equable climate are very valuable; also iron and saline purges, *e.g.*, the effervescing sulphate of soda.

WAXY KIDNEY.

Waxy or "butter" kidneys occur in the same circumstances as splenic or hepatic lardaceous disease.

When denominated "butter" kidneys there is present besides the waxy change in the glomeruli and vessels, a form of nephritis which most resembles that of the large white kidney. Waxy changes are very apt to be mixed with other alterations; sometimes cirrhosis and waxy alterations co-exist with parenchymatous (epithelial) nephritis. The unravelling of the etiology of such cases is still unsatisfactory, but probably epithelial changes arise in any other form of kidney disease. The kidneys increase in size and weight and are smooth on the surface unless sclerosis has complicated. In advanced stages all the renal tissues may yield the iodine and methyl violet tests of the waxy degeneration.

In marked cases the urine is pale, of rather low specific gravity, moderately albuminous, increased in quantity, and may deposit hyaline, granular or epithelial casts.

If fatty casts are present constantly it proves the existence of epithelial nephritis as a complication. It will be noted that the characters of the urine are most like those of granular contracting kidney, but the associations are different—high arterial

tension, heart hypertrophy and retinitis not occurring unless cirrhosis of the kidney has been present. Seeing that lardaceous probably originates parenchymatous nephritis, it is plain that the characters of the urine and other symptoms may be confused by this admixture of diseases.

It may be interesting to remember that lardaceous disease, which first attacks vessels, allows of easy leakage, therefore, in pure lardaceous disease of (intestines and) kidneys the tendency to uræmia would probably be less as compared with the parenchymatous forms of nephritis, for plenty of water and urea could escape.

TUBERCULAR KIDNEY.

The lung, testicle, lymphatic glands, kidney and spleen may be the seats of any form of tubercular process. The presence of the specific tubercles also everywhere excites inflammatory changes around them, and these alterations will be of catarrhal sort in those organs which possess ducts —kidneys, testicles, lungs. Cavities may result, especially in the latter organs, and caseation with softening may occur.

Miliary gray granulations, unrecognised by symptoms during life, are often found at necropsies, especially of acute tuberculosis, chiefly in the cortex of both kidneys. The most important clinical form of tubercular disease is pyelitis mixed with tubercular destruction of the kidney itself—aptly called nephrophthisis. In the pus and discharged granular and cheesy fragments tubercle bacilli are often found. Sometimes this nephrophthisis is the most staring clinical symptom, but tubercles generally exist in other parts, and an examination of the testes and vesiculæ seminales should never be omitted. The ureter very often

gets blocked temporarily or permanently. Tubercles and ulcers may be found along its course and in the bladder and urethra; the author has seen such specimens even in young children. The symptoms are like those of any other affection of the urinary organs, but are often very few in number; acid pyuria may be the only sign.

The treatment is the same as in phthisis elsewhere; if we could be certain of its limitation to one kidney, the suggestion of scraping away the diseased tissue, just as in erasion of joints, might be not foolish.

NEW GROWTHS OF THE KIDNEY.

Secondary nodules of sarcoma and carcinoma may be found at post-mortem examinations, their presence during life being unknown or suggested by hæmaturia. The urine may yield black pigment in melanotic sarcoma.

Infants are prone to grow large, even enormous, sarcomata in their kidneys or in tissues closely adjacent to these organs (lumbar glands, adrenals, vertebræ).* Plain muscular tissue and striated muscle fibre have been found in such tumours as well as the true sarcomatous tissue. Swelling of the belly is often the first sign noted by the parent; both pain and hæmaturia may be absent; the colon lies in front of the tumour as may be felt by palpation or percussion may detect a resonant band. Œdema of the legs, swelling of the superficial veins and ascites are pressure effects. The children die within six months, as a rule, of the discovery of the tumour, and it seems useless to remove this for secondary growths are almost invariably present—if the tumour be discovered early

* See a paper by the Author in the *Proceedings of Medical Society* for 1887.

the attempt might be made to excise it, but up to the present the operation has never been successful.

In older people cancer may arise and the points of interest are its relatively long duration—it may last for years, and its association with calculus. Sometimes the spinal column gets infiltrated and the spinal cord compressed whence the "paraplegia dolorosa." Secondary growths may occur anywhere, even in the brain.

Sallowness, anæmia, emaciation and loss of strength, proportional to one another, with a tumour in the loin in a man past middle life should be diagnosed as due to cancer of the kidney-region, even if hæmaturia and pain be slight or absent, as they may be.

Section XIII.

DISEASES OF THE NERVOUS SYSTEM.

It is time that the student of medicine should get rid of the notion that nervous diseases can only be understood by the few. With a fair knowledge of the physiology and anatomy of the nervous system, their successful study involves no more labour or intelligence than the study of diseases in other parts of the body.

All clinical diseases of the nervous system present perversion of nervous functions. The number of nervous functions and therefore of nervous symptoms, though numerous, is limited, let the combination of symptoms be as variable and as complex as they may.

DISORDERS OF NUTRITION.

We do not know whether trophic nerve centres and nerve fibres exist as separate structures, but of their potential existence there can be no doubt. Lesions of nerves, cord and brain have the power of causing disturbances of nutrition of any tissue in the body; probably the nervous lesion is always of an "irritative" character.

The maintenance of the nutrition of a nerve fibre depends on the nerve cell of which it is a branch. Section of a nerve causes degeneration of all those fibres which are separated from their nerve cells. The large multipolar cells of the spinal cord are the sources of nutrition of the motor nerve fibres, therefore section of the anterior root leads to degeneration of the motor fibres of a mixed nerve trunk. Section of the posterior root causes degeneration of the nerve fibres ascending into the cord above the section, because the ganglion on the posterior nerve root guides their nutrition. These degenerations are called Wallerian, after Waller their discoverer. The medullary sheath coagulates and breaks up into myelin drops which tend to become absorbed. The nuclei of the neurilemma multiply, and their surrounding protoplasm increases in amount, and the axis cylinder gradually wastes with or without preliminary irritative overgrowth.

The connective tissues of the nerves overgrow and produce sclerosis. The same changes occur in the spinal cord nerve fibres in which descending and ascending degenerations may be noted. The lateral columns present descending degeneration of their crossed and direct pyramidal tracts, and ascending degeneration of the parts known as the ascending antero-lateral tracts—a tract of nerve fibres best marked in the cervical enlargement of

the spinal cord and situated well in front of the crossed pyramidal tracts. The direct cerebellar tract separates the crossed pyramidal tract from the pia mater in the dorsal and cervical regions of the spinal cord; it does not exist in the lumbar region; it is believed to be in connection with the cells of Clarke's column; it degenerates upwards.

It will be observed that nerve fibres always degenerate in the same direction as they conduct nervous impulses.

When motor nerves or nerve cells are destroyed or degenerated, the muscles innervated by them waste, as seen in peripheral neuritis, infantile palsy, and progressive muscular atrophy. Inflammation of joints, generally of subacute or chronic character, has been observed in peripheral neuritis, in locomotor ataxy, and in brain lesions. The skin may present sweating, hyperæmia, œdema, herpetic vesicles, altered pigmentation, gangrene (bed sores) in neuritis, myelitis, and cerebral lesions. Hair may grow too quickly, may become gray or fall out, the nails may present similar signs of alteration as the result of morbid nervous states.

Indeed no function of the body appears to be beyond the reach of the benign or malignant influence of the nervous system. Indigestion may result from mental anxiety, jaundice from emotional shock. The influence of a cheerful state of mind in aiding recovery from disease affords an example of the beneficent influence of healthy "nerves."

THE NERVES AND MUSCLES IN WASTING DISEASES.

When nutrition is impaired by continued fevers or by such cachexia as anæmia, cancer and

tubercle, the whole neuro-muscular apparatus suffers, but especially those parts which are at a disadvantage in their sources of nutrition. The muscles waste and become feeble, the nerves also get impaired, and a general increase in irritability may be observed; tapping the muscles on "motor points" of the nerves causes contractions with undue readiness, the knee jerks are exaggerated and ankle clonus may be obtained (*see also* Peripheral Neuritis).

The fibres of the pyramidal tracts are very long, reaching without interruption from their cells in the motor area of the cerebral cortex down to the lumbar enlargement in the case of the leg fibres; to maintain the nutrition of these long leg fibres must be exceedingly difficult unless the cortical cells are well nourished. The pyramidal tracts do exercise a restraining influence over the motor nerve cells of the spinal cord, and if they are weakened this inhibitory influence is of course lessened, and this may well be the reason why the knee jerks are exaggerated, and why even ankle clonus may develop, as in severe cases of typhoid fever. True, actual minute lesions have been found in the spinal cord after death from typhus and typhoid fever, but the author is now referring to numerous cases in which the hyperkinetic phenomena disappear as the patient recovers, and it seems easier to explain such disappearance on the above theory rather than to suppose that demonstrable lesions existed, but disappeared also.

The sympathetic nervous system is intimately related to the cerebro-spinal system, and according to Gaskell, is derived in part from it.

The white rami communicantes are formed by an outflow of medullated nerves from both anterior and posterior roots of the spinal nerves between the second thoracic and second lumbar inclusive. These medullated nerves pass not only into the

lateral sympathetic ganglia, but also form three main streams:—(1) upwards into the cervical ganglia, (2) downwards into the lumbar and sacral ganglia, and (3) outwards into the collateral ganglia. These nerve fibres are of very small calibre. The cells of Clarke's column in the spinal cord may be the real source of these visceral nerves. These fine medullated nerve fibres lose their medullary sheath after passing through the sympathetic ganglia. It is through these nerves that the supreme vasomotor centre of the medulla oblongata exerts its influence on the visceral vessels.

DISEASES OF THE NERVES.

In these affections, pain, loss of muscular power, and disturbance of sensibility of the skin and other structures are the main symptoms.

When pain alone exists the term neuralgia is applied. But it will be seen that even in simple neuralgia, other phenomena may occur, so that the physiology of nerve fibres may guide us in looking for various derangements. We know that besides being conductors of motor impulses downwards, nerves also are capable of influencing the nutrition of parts to which they go, and this function is called trophic. It is convenient therefore to speak of trophic fibres as well as motor and sensory fibres, but it is possible that the same nerve fibres which subserve motion and sensation may also guide the nutrition of the tissues to which such motor and sensory fibres are distributed.

There can be no difficulty in understanding, then, that lesions of mixed nerve trunks may present motor, sensory and trophic symptoms. Modern pathology further shows that mixed nerves may be so diseased that chiefly the sensory, chiefly the

motor, or chiefly the trophic fibres may be damaged.

In lead palsy, for example, the motor nerve fibres may be alone affected, but then trophic changes occur in the muscles supplied by the damaged motor fibres.

Alcohol may produce symptoms chiefly referable to sensory fibres. In certain cases of locomotor ataxy the nerve fibres concerned in the so-called "muscular sense" may be almost alone affected, power not being lost and cutaneous sensation being only slightly affected; the spinal cord in such cases has been proved to be healthy by careful examination after death (pseudo-tabes).

PERIPHERAL NEURITIS; POLYNEURITIS; NEURITIS MULTIPLEX.

Certain infectious diseases may cause neuritis: diphtheria, typhoid, beriberi, syphilis, tuberculosis. Toxic varieties of peripheral neuritis result from alcohol, lead, arsenic, phosphorus, ergot, mercury, carbonic oxide. Over-exertion and cold, pernicious anæmia, chlorosis, cachexia, marasmus and diabetes are other reputed causes.

As a rule the neuritis affects those parts of the nerves most distant from the spinal cord. The nerve-fibres are energised and their nutrition maintained by their spinal or ganglionic centres, and it is easy to understand that this energisation and maintenance of nutrition would be most difficult in those parts of the fibres furthest from the centres.

The neuritis may be inflammatory or degenerative.

The infectious forms of neuritis attack usually the motor fibres, but occasionally the sensory, and then the symptoms look like those found in ataxy.

The cause of infectious neuritis is probably not the infective agent which causes the fever, because this has usually exhausted itself before the symptoms of neuritis appear. Some believe it is an alkaloidal poison generated by the infectious fever, and this would place "infectious" neuritis on a par with other cases of toxic neuritis—lead, etc.

The varieties of diabetic neuritis have a close likeness with those of alcoholic neuritis and three forms may be recognised; chiefly hyperæsthetic, chiefly motor, chiefly ataxic—varieties whose names explain themselves. It is probable that the visceral and other nerves suffer in the same way as the trunk and limb nerves. It is possible, too, that alcohol may cause its visceral diseases by its action on visceral nerves.

Phenomena of exaggerated action occur during the early stage of neuritis: pain, hyperæsthesia and other dysæsthesiæ, muscular twitchings, cramps; irritability on percussion of the muscle (mechanical) is increased, but very seldom indeed is there increased faradic irritability; even in the early stage volitional movements are weakened.

Phenomena of loss of action occur later; anæsthesia and more marked paralysis. The muscles tend to waste rapidly and the "reaction of degeneration," R. D., is usually present at the end of a week if the motor fibres are suffering.

The reaction of degeneration consists in loss or diminution of irritability to the faradic (interrupted) current with exaggerated and perverted irritability to the galvanic (constant) current. In health the feeblest constant current causing muscular contraction occurs when the current is made at the negative pole, this is called negative make or cathodal closure. In health the strongest galvanic current that can be borne with equanimity does not cause a muscular contraction when the current is broken at the negative pole, *i.e.*, cathodal open-

ing. Positive make and break—anodal closing and opening, cause contractions with a moderately strong galvanic current.

In the R. D. the positive make and break contraction may occur with the same strength of current as the negative make, and the negative break may cause contraction when the current is comparatively feeble.

It is most important to remember that a strength of galvanic current which would be insufficient to cause contraction in health may cause the liveliest contractions when the nerve-fibres are degenerating.

Further, the mode of contraction of the muscles in the reaction of degeneration is slow and vermicular like that of the plain muscular tissue, and very much contrasts with the rapid contraction of healthy striated muscular tissue.

Trophic changes in other than muscular tissues also ensue, the skin may present atrophy (glossy skin), the hairs may fall out or grow unduly, the nails may become brittle and friable, discoloured, ridged, furrowed and their rate of growth variously altered, pigmentary alterations may be noted and also localised or generalised sweatings. Transient patches of hyperæmia and œdema, alone or together, may develop; even herpetic eruptions may break out with exacerbations of the pain; and writing on the affected skin may evoke well marked characters, which, though generally red with white borders, may be white with a pink background.

The tendon reflexes are early diminished and abolished, the knee-jerk being lost; these phenomena are never exaggerated for more than a day or so when the neuritis involves the motor nerve-fibres; the superficial reflexes may be retained until the muscles are so wasted as practically not to exist. The morbid signs of multiple neuritis

are almost always most marked at the distal parts of the limbs.

When the musculo-spiral nerve is affected, as in lead neuritis, the "wrist drop" occurs; we have also a "foot drop," not ankle drop, when the anterior tibial muscles are paralysed.

It is useful to remember that the extensor and abductor muscles and nervous centres and fibres are weaker than the flexors and adductors; or at least these suffer first and most and recover last when any disease affects all the muscles. In hemiplegia, as well as in peripheral paralysis, the extension movement at the wrist and ankle is most paralysed and the last to be recovered. The abductor deltoid is very prone to paralysis, and recovery of its powers appears to be very difficult. The abductors of the vocal cords may be cited as a further illustration (see p. 112).

Tenderness of the nerve trunks and enlargement of the same may be of diagnostic value.

At the necropsy the nerves may be normal to the naked eye; hence the importance of a microscopical examination.

In peripheral neuritis due to alcoholic poisoning, &c., symmetry is an important characteristic, and the sensory and motor paralysis tends to spread from the feet and hands upwards. When one group of muscles is most paralysed the antagonists overacting may cause deformities and contractures. In this respect there is no difference between spinal and neural paralysis. As in infantile spinal paralysis the limbs are flaccid and "flop" down when held up. The only paralyses of sudden onset in peripheral cases are those due to pressure on the nerves. A man goes to sleep after drinking and his arm lies against the hard bed in such a way as to cause pressure on the brachial nerves, next morning on awaking the weakness is discovered, and *apart* from the history

of pressure it may be very difficult to say whether the seat of the lesion is cord or nerve trunk. The distribution of the paralysis may be irregular, such as corresponds not to a function of the spinal cord but to the distribution of the nerves to muscles.

As in cornual myelitis, the "sphincters" are not usually affected. In a few cases the visceral nerves may be diseased, and in a few cases of infantile palsy the sphincters have been paralysed.

The differential diagnosis between cerebral, spinal, and peripheral paralysis is often easy, but sometimes the difficulties are very great.

In the majority of cases we tell a brain palsy from the other two kinds by (1) the deep reflexes being exaggerated, (2) the superficial reflexes diminished; there is no loss of faradic irritability nor rapid muscular wasting. Besides there will generally be evidence of coarse brain disease—headache, vomiting, optic neuritis and convulsions of Jacksonian kind.

To tell spinal from peripheral palsy, the following points possess some value: if sensory derangements are absent, the lesion is probably not peripheral. In both palsies the R. D. with loss of faradic irritability and rapid wasting obtains. If the onset is very sudden and there are not any sensory changes, the spinal cord is most probably the seat of disease. The difficulty of distinguishing spinal motor from nerve motor palsy exists chiefly because the nerve motor fibre is nothing but a limb of its parent centre.

Frequently peripheral neuritis is gradual in onset and slowly progressive, but so also are some forms of myelitis. The author is convinced that it is best not to teach what is not a fact—the differential diagnosis between cord and nerve lesion *may* be impossible during life. Even tender and thickened nerve trunks do not prove that the spinal cord is not diseased, for such tenderness

and induration do supervene in lesions which were primarily brain and cord.

In multiple neuritis affecting all four limbs, the diagnosis is not difficult because cord lesions seldom cause such a combination of motor and sensory disorders (*see* Alcoholic Neuritis), yet the facility of diagnosis in such cases does not come about as the result of any method of physical examination, but only from our knowing by past experience that such a combination mostly results from multiple neuritis.

As in the cord, so in the nerves, it requires far greater damage to interrupt the passage of sensory impulses than to stop the passage of motor impulses; movement may be completely lost, but sensation seldom so completely.

Evidence is still wanting as to whether spinal as well as nerve palsies need always present loss of faradic reaction. As a rule, when motor palsy is marked, the faradic irritability is diminished or lost. In diphtheritic palsy which is believed to be of nerve origin, faradic irritability is sometimes lost and sometimes natural.

THE MOTOR CENTRES.

The mutual relations of the cerebral motors and the spinal motors must be thoroughly grasped. The former have their centres in the cortical motor area, and their nerve fibres constitute the pyramidal tracts which are continuous from the centres through the corona radiata, internal capsule, cerebral peduncle, pons, medulla and cord. The two motors are organically connected, and the mode of connexion is probably that represented in Gowers' *Manual*, vol. ii., the branching processes of the spinal motor cells join with the

branching processes of the fibres of the pyramidal tract. Probably every part of the upper cerebral motor exercises a restraining influence over the lower motor.

The cortical motor centres are arranged about the fissure of Rolando on the convex and mesial surfaces of each hemisphere. Face lips and tongue are represented in the lower parts of the motor area, arm in the middle parts, and leg and trunk in the upper parts (and mesial aspect in monkeys and probably in man).

In right handed people, the speech centres are on the left side of the brain, the posterior part of the third frontal (Broca's) and the adjacent parts of the central convolutions being concerned in the motor speech processes.

In the arm centres in monkeys, stimulation of the upper part causes movements commencing in the shoulders; of the mid parts, movements commencing in the wrists; of the lowest parts, movements beginning in the thumbs.

When disease affects these parts, paralysis results of those parts which are destroyed, convulsion of those parts irritated, whence the terms "destroying" and "discharging" lesions. Coarse disease is prone to cause Jacksonian epilepsy, the characters of which are, (1) the slow onset attended with a "warning" or "aura" which may be of any sort, but is usually localised to some part of the trunk or limb; (2) the comparatively slow march of the discharge causing the convulsion; (3) its passage in a definite direction which is the same in each fit; and (4) what is also implied in this, the late loss of consciousness. Thus in one case, the patient first felt a tingling sensation in the tongue, next the face showed spasm, then the arm contracted and afterwards the leg, before consciousness was lost, in which the convulsions became general. Softening, tumours,

and chronic syphilitic changes in or near the motor region may cause such symptoms. The fit may be arrested by ligaturing or grasping tightly the arm above the seat of the first sign of discharge supposing this to begin as it often does in the thumb or fingers.

Frequently in such cases some local paralysis exists, and the signs of coarse brain disease also: vomiting, headache, optic neuritis. Transient paralysis of wider extent may be noted in these cases if the epileptiform fit has been severe—paralysis from temporary exhaustion.

It will be observed that in the cortex the order of the centres from below upwards is tongue, lips, face, arm, leg, trunk. Now in the internal capsule the order of the fibres proceeding from these centres is from before backwards: tongue, lips, face, arm, leg, trunk. The internal capsule is a broad band of white fibres having a fan shape with a convexity towards the middle line; its anterior limb is situate between the caudate nucleus and the lenticular nucleus; its posterior limb between the optic thalamus and the lenticular nucleus, which latter body thus occupies the obtuse angle formed by the two limbs; the junction or bend between the two limbs is called the knee (genu) or elbow, this contains the fibres from the tongue, lips, and face centres. The anterior limb fibres go from the frontal lobes to the cerebellum. The anterior two-thirds of the posterior limb is motor containing some face, all the arm and leg, and perhaps the trunk, fibres.

The posterior third of the posterior limb is called the "sensory crossway;" its fibres are purely sensory: section of it causes hemianopia and hemianæsthesia of the opposite side of the body and loss of the special senses on the opposite side of the body.

The motor fibres occupy the middle two-fifths of

the cerebral peduncle; the inner fifth of the crus consisting of the fronto-cerebellar fibres; the outer fifth of fibres radiating into the white substance of the occipital and temporo-sphenoidal lobes which connect these lobes with the cerebellum.

The sensory path is very imperfectly known.

The fibres of the posterior columns and the "antero-lateral tract" or lateral column in front of the pyramidal tract most probably are sensory in function; the path is continued up beneath the corpora quadragemina through the tegmentum of the crus cerebri above the locus niger and so into the internal capsule where it is called the sensory crossway.

Whatever the explanation may be, it must be remembered that to abolish all sensory conduction in the cord is much more difficult than to abolish all motor conduction, and this is one argument in favour of the old view of Brown-Sequard that sensation may pass up even when only a strand of gray matter remains to conduct it.

The sensory impulses are known to cross over from the side at which they enter the cord, and this takes place only a little above the level at which the sensory nerves enter; after this crossing they certainly continue up in the same side till the pons is reached. Some fibres of the sensory tract enter the optic thalamus, but what service they there perform no one knows. The bulk of the other fibres appears to go to the "motor" region and probably subserve tactile sensibility—touch, pain and temperature. Lesions of the motor region certainly cause sensory disturbances as well as motor signs; if the large pyramidal cells of the motor cortex are the centres for motion, perhaps other smaller cells are concerned with the making of sensation.

VISION.

In human beings rather more than half the fibres of one optic nerve cross over to the opposite optic tract at the optic chiasma. These crossing fibres come from the nasal half of the retina—those which subserve vision in the temporal half of the field of vision. Hence if one eye be extirpated its optic nerve will degenerate but the opposite optic tract will be smaller than the optic tract on the same side as the extirpated eye.

Section or disease of the right optic tract will destroy vision in the left halves of the fields of vision (hemiopia, hemianopia) because the right half of each retina will be paralysed. In binocular vision an object will make its image on corresponding parts of each retina, *i.e.*, the nasal in one eye and the temporal in the other at points equidistant from the yellow spot.

The path by which sight is subserved passes in the optic tract by the corpora geniculata through the white matter of the hemisphere to the occipital lobe on the convex surface. Hemianopia may be caused at any part of this path or centre, above the decussation.

Some fibres of the optic tract unquestionably pass into the optic thalamus, external geniculate body and corpora quadrigemina and some fibres do issue from these three bodies into the white matter of the hemispheres, but we do not know whether it is the same fibres which pass into, that issue from, these bodies. We cannot yet say whether the entering fibres ended in nerve-cells, nor whether the latter gave off the fibres which go into the white matter of the hemispheres. Very likely the fibres which go into the corpora quadrigemina subserve ocular movements.

The centre for smell has not been yet discovered

though the anterior extremity of the uncinate gyrus on the inner surface of the hemisphere, appears to be in relation with smell. Smell has been lost on the opposite side to a cortical lesion affecting only the outer surface of the hemisphere.

The first temporo-sphenoidal convolution subserves hearing from the opposite ear.

In hysteria there may be marked dimness of vision with peripheral restriction of the field of vision and loss of colour vision of one eye, and with slight impairment of vision in the other eye; this is most common when there is hemianæsthesia on that side of the body on which the vision is most spoilt, and as this hemianæsthesia is certainly due to impaired action of the opposite cerebral hemisphere the weak vision is called "crossed amblyopia." Why it should be that vision is not lost in hemianopic fashion, is very difficult of explanation (*see* Gowers' *Manual*).

Blindness may be of various kinds; there may be "scotomata" of almost any part of the visual field. Thus in neuro-retinitis from Bright's disease, brain disease, or from syphilis, there may be central scotoma, vision being lost in the very centre of the field of vision, that part which is subserved by the macula lutea; similar central scotomata have been noted in tobacco and alcoholic amblyopia.

The field of vision may be less extensive at the periphery than it should be—peripheral contraction; this is most often due to local disease of the optic nerve or eyeball—as glaucoma, optic nerve atrophy or neuritis.

Amblyopia and other disturbances of sight may be met with in many forms of toxæmia—uræmia, diabetes, acute specific fevers, in many forms of cachexia; also in nerve diseases: hysteria, megrim, epilepsy, diphtheritic nerve disease. This may not be due to visible retinal change.

OLFACTORY NERVES.

Congenital anosmia has been found to be dependent on want of development of the olfactory lobes. Ozæna from local disease is the commonest cause of loss of smell. Hysteria may cause loss of smell on one side as in hysterical hemianæsthesia. Epilepsy sometimes manifests its fit with an awful or strange olfactory sensation. Perverted and hypersensitive states of smell are met with in many mental diseases.

Since the middle cerebral artery supplies the external root of the olfactory bulb, there may be loss of smell on the same side as the brain lesion, on the opposite side of the hemiplegia, in cases of embolic softening due to embolism of the middle cerebral artery.

OPTIC NEURITIS.

This may be present in severe degree without impairment of any function of sight, and without any pain or photophobia. Diminished acuity of vision, restriction of the visual field, and defect of colour vision are, however, frequently present.

"Coarse" brain disease and granular kidneys may cause optic neuritis or neuro-retinitis with hæmorrhages into the retina.

Optic neuritis and retinitis have very rarely occurred without there being evidence after death of any brain disease or of Bright's disease. Cerebral tumours do not always cause optic neuritis; cerebellar tumours more often cause optic neuritis than any other intracranial tumour. Under the term "coarse" brain disease is included tumours, aneurysms, abscesses, hydatids, meningitis. Basic

meningitis is, after intracranial tumour, the most common cause of optic neuritis.

Syphilis, exposure to cold, lead poisoning, amenorrhœa, anæmia and chlorosis have been associated with optic neuritis. So also have acute myelitis, cerebral hæmorrhage, and some acute specific fevers.

Optic neuritis is usually bilateral, but not of equal intensity at the same time in the two eyes. Unilateral optic neuritis is generally due to disease about the orbit, but sometimes to a tumour of the opposite side of the brain.

OPTIC NERVE ATROPHY.

Atrophy of the optic nerve may follow neuritis, choroiditis and other diseases destroying the eye, and it may occur as a primary disease.

Primary atrophy consisting of degeneration and wasting of the axis cylinders of the optic nerve may be seen in locomotor ataxia, this is called "gray atrophy." In general paralysis of the insane, in disseminated and lateral sclerosis it also occurs. Pressure on the optic chiasma may lead to it. In hemicrania, optic nerve atrophy has occasionally been found on the same side as the migraine. Syphilis and diabetes are other given causes. The atrophy sometimes seems to be hereditary, and at other times no cause can be ascertained (idiopathic).

RETINAL HÆMORRHAGES.

Retinal hæmorrhages are common in diseases outside the nervous system: chronic Bright's disease and mitral disease—in which disturbances of

the blood pressure are the chief causes; various forms of toxæmia may cause it; septicæmia, severe anæmias, leucocythæmia, scurvy, also emboli especially infective ones, as in ulcerative endocarditis.

Defects of colour vision are common from optic nerve atrophy; they also occur in locomotor ataxy, hysteria, migraine, alcoholism, and nicotine poisoning. In health the area of the visual field over which green can be perceived is very much more limited than that over which other colours can be recognised.

ASTHENOPIA.

Asthenopia or weak sight occurs from many causes: hypermetropia, myopia, and general nervous debility, however induced. In hypermetropia the use of the eyes for near work gives rise to a morbid sensation in the eyeball and to headache, the symptoms being due to overaction of the ciliary muscle. In myopia the internal recti are weak, and it is the strain on them which is given as the cause of the weak sight; headache, indistinctness of vision and diplopia, and apparent movement of visual images are the symptoms.

In exhaustion of the visual centres and paths occurring from general debility, the field of vision is contracted, the acuity of vision diminished, and defects of colour vision obtain. The retina is perhaps more easily exhausted than other parts of the visual apparatus. So easily exhausted does the apparatus become that an object looked steadily at for a few minutes may disappear from view. This phenomenon has resemblances to the normal rapid exhaustion of the retina for red light.

Small pupils, myosis, are probably due to overaction of the constrictor pupillæ which is supplied

by one of the third nerve centres. Locomotor ataxia, hæmorrhage into the pons, poisoning by opium and physostigmine, are common causes of it in medical practice. Hypermetropia, headache, photophobia, may be attended with a small pupil.

Sometimes a small pupil results from paralysis of the motor centre of the dilator pupillæ which is situated in the lowest part of the cervical enlargement of the spinal cord—cilio-spinal region of Budge. From this cause myosis on one or both sides may obtain in progressive muscular atrophy, locomotor ataxia, rupture of the brachial plexus.

Dilatation of the pupil, mydriasis, may be observed in errors of ocular refraction, in glaucoma, in paralysis of the third nerve, in typhoid fever, in exhausting diseases, in cerebral compression, in optic nerve atrophy; atropine dilates the pupil by paralysing the third nerve, cocaine by stimulating the terminations of the dilator fibres which are contained in the sympathetic nerve.

"Inequality of pupil" is common from errors of refraction; it develops also in general paralysis of the insane, in locomotor ataxy and in many other functional and organic nervous diseases it may also be observed. Local causes such as synechiæ, old iritis, may cause the outline of the pupil to be of very curious shapes.

The phenomenon known as "hippus" or clonic spasm of the iris has been seen in many local ocular affections, also in cerebellar tumour, multiple sclerosis and locomotor ataxy.

CONJUGATE DEVIATION OF THE HEAD AND EYES.

The mechanism on which these movements are dependent is composed of a cortical and a lower centre situate either in the superior olivary body or in the sixth nerve nucleus.

In each of these centres movements of muscles of opposite sides of the body are represented. Stimulation—by disease or other means—of the left cortical centre puts the eyes to the right and the chin to the right; the ocular movement must be due to the right sixth nerve and the left third supplying the internal rectus muscle; the head movement must be due to the action of the left sternomastoid and the right deep cervical muscles. Hæmorrhage into the cerebral hemisphere often makes the patient "look towards his lesion," this arises from the unbalanced action of the cortical centre (for conjugate deviation of the head and eyes) of the sound hemisphere.

In tumour of, say the left side of the pons, the eyes cannot be conjugately deviated to the left side, but yet the right internal rectus may come into action for other movements, *e.g.*, in accommodation; this is due to the destruction of the centre in which is represented the movements for conjugate lateral deviation of the eyes to the left, all other centres being left intact. In such cases the unbalanced action of the centres on the right side may cause conjugate deviation of the eyes to the right.

The conjugate movement of the eyeballs downwards or upwards or in any other possible direction may be lost from disease of the corpora quadrigemina or middle lobe of the cerebellum.

In sleep the eyeballs vary in position in different individuals and at different times in the same individual; the same holds good in coma; convergence is infrequent, parallelism and divergence of the optic axes are common.

Ophthalmoplegia interna consists in loss of reaction of the pupils to light and accommodation, and loss of motion of the dilator pupillæ and Brücke's muscle. It may co-exist with ophthalmoplegia externa, in which all the external ocular

muscles are paralysed. Diphtheria, syphilis, locomotor ataxy and other degenerative diseases affecting the base of the brain are the commonest causes of ophthalmoplegia.

Inability to look downwards is generally associated with inability to converge the eyeballs and to accommodate for near vision.

Nystagmus consists in oscillations of the eyeballs, which may be slow or rapid, and may occur with or without voluntary movement of the eyes. Its causes are very numerous: albinism, miner's nystagmus, congenital defects, retinitis pigmentosa, cataract, leucomata; of pure medical diseases the commonest causing nystagmus are disseminated sclerosis and cerebellar tumours; locomotor ataxy is another rare cause. The author knows a nurse who has acquired the habit of producing rapid nystagmus at will. Nystagmus is generally bilateral, only very rarely unilateral.

CRANIAL NERVES.

The *third nerve* arises from nuclei situated on the floor of the aqueduct of Sylvius and reaches the cerebral surface on the inner side of the crus cerebri; lesions of the crus are therefore often attended with a crossed paralysis, the third nerve being paralysed on the same side as the lesion, and the limbs and face on the opposite side of the body. The third nerve nuclei are probably very complicated, corresponding to the various combined movements of the eyeballs, which are dictated no doubt from the cerebral cortex. The centres controlling the eyeball movements are situate furthest back. That for the ciliary muscle is furthest forward, next comes that for the light reflex contraction of the pupil, then the levator

palpebræ, next those for the rectus internus and rectus superior, lastly those for the rectus inferior and obliquus inferior. Behind these comes the fourth nerve nucleus of the superior oblique.

Taste has its peripheral organs on the front and back of the tongue and on the fauces also. Gowers believes that the fifth nerve fibres subserve this function at all its peripheral sites; the chorda tympani is the nerve of taste for the anterior two-thirds of the tongue, its gustatory fibres may come from the fifth by way of the Vidian nerve; the course of the gustatory fibres which are distributed with the glosso-pharyngeal nerve to the soft palate and palatine arch must be round about. Still, taste has been lost on all parts of one side in cases of ear disease. It has also been completely lost on one side in a case in which the fifth nerve was destroyed at its surface origin from the pons.

The fifth cranial nerve, if Gowers is right, subserves special as well as common sensation to the skin and mucous membrane of the front of the head. It has also trophic qualities: *e.g.*, neuro-paralytic ophthalmia if disease involves certain parts, especially the Gasserian ganglion; herpes zoster, possibly glaucoma, and hemiatrophy of the face.

Paralysis of the sixth nerve is very common indeed and of but little value in localising a lesion. It runs a long course beneath the pons, parallel to the basilar artery where it is easily compressed by pontine and cerebellar tumours.

The facial nerve has its cortical centre at the lower extremities of the central convolutions; its fibres descend through the knee of the internal capsule to the pons in the middle of which it crosses to its lower centre. If the facial nerve fibres to the orbicularis oris be really supplied from the hypoglossal nucleus as Gowers believes,

then a ready explanation is afforded of the proneness of the tongue and mouth muscles to be affected together in spasm and in paralysis. When the orbicularis is unduly irritable to mechanical percussion the tongue may be so too (lingual irritability);* we have sometimes seen clonic spasms limited to these two muscles; in bulbar palsy the tongue and lips are affected together.

Facial palsy may be due to lesion seated anywhere in the path of the facial nerve.

When peripheral the eye, as well as all other, muscles are paralysed (lagophthalmos); the patient being asked to close the eye, turns the eyeball upwards and lets fall the eyelid, but still the sclerotic is not covered; the conjunctival reflex is lost; the muscles do not respond to faradism, and yield the characteristic changes to galvanism of the R. D. These facts obtain provided the nerve or its pontine nucleus is dead. In supra-nuclear palsy (cerebral facial palsy) the most volitional movements only are lost, *i.e.*, those about the mouth, and winking on one side may be lost also.

In violent laughing or crying both sides of the face may act equally, indeed, the weak side may overact.

Tonic and clonic spasms are common in the facial muscles, and motor part of the fifth, and are generally due to irritation of the trigeminal nerve: carious teeth and dental irritation are the commonest causes of trigeminal neuralgia which is often attended with facial spasm—convulsive tic.

SPINAL ACCESSORY NERVE.

This nerve supplies muscles which more often present spasm than palsy. The spasm may be mixed

* See paper by Author, *British Medical Journal*, vol. i., 1889.

tonic and clonic or either tonic and clonic; the clonic form is often bilateral.

The spasmodic wry neck is well-known—torticollis. It is often due to irritation of a tender occipital gland, but may be due to many other peripheral and central causes.

Eclampsia nutans, nodding spasm or Salaam convulsion is an interesting bilateral clonic spasm of not very infrequent occurrence in children.

Cervical opisthotonos or retraction of the neck depends on spasm of deeper cervical muscles supplied by cervical nerves. Besides nodding movements, shaking (rotatory) movements of the head may be noticed; these clonic co-ordinate spasms are probably dependent on regular rhythmic nerve discharges from spinal centres; the possibility of their dependence on cortical irritation must be considered. The head may be bowed and the trunk bent forward sixty times a minute, but the rate of rhythm varies in different cases. Epileptic losses of consciousness and convulsions, have supervened in many cases, and this fact increases the likelihood of the cortical origin of the affection.

Head shaking, the chin being rapidly jerked too and fro equal distances on either side of the middle line, are seen not only in infants, but also in those who are cutting their second teeth One case occurred in a boy aged 12, who had been the subject of many funny habit spasms, and whose stuttering speech testified to the imperfection of the nervous apparatus; his mother died, aged 31, in an asylum. Nystagmus and other ocular spasms may be associated. Head banging is a severer form of clonic spasm which may be seen in children.

Good hygiene, tonics, plenty of fresh air, arsenic, strychnia and leaving off school-work are the best recommendations in treatment.

Faradisation, galvanism and massage have proved of service.

THE PNEUMOGASTRIC NERVE.

The pneumogastric nerve has most important and extensive anatomical relations; it is often diseased; frequently its affections are transient and not serious; less often fatal consequences may be caused by it. In epilepsy, hysteria and megrim sensations are referred to its perversion, and vomiting is dependent on it. The motor part of it is supplied from the spinal accessory.

The pharynx and larynx may be paralysed by disease of it, as in pontine and bulbar disease, and in diphtheritic paralysis.

Laryngeal crises of locomotor ataxia are subserved by it; these crises are like the paroxysms of whooping cough; progressive paralysis of the laryngeal muscles has been noted in connection with these crises.

THE HYPOGLOSSAL NERVE.

The hypoglossal nerve is purely motor and behaves just like the facial nerve and anterior spinal nerves; it decussates in the medulla. The tongue wastes and loses its faradic irritability when its medullary nucleus or the nerve fibres proceeding therefrom are diseased. Hemiatrophy of the tongue thus results in bulbar palsy, and also occasionally in locomotor ataxia, when the degeneration spreads to the motor nucleus. In hemiplegia the tongue when protruded goes over to the paralysed side because of the unbalanced action of the healthy genio-hyoglossus. The volitional movements of the tongue may be lost by a lesion either at its cortical centre or anywhere along its cerebral path.

The nuclei of the floor of the fourth ventricle are arranged so that the motors lie nearest the middle line on each side. The nuclei may be remembered to be arranged, roughly speaking, in three parallel series, one outside the other; the sixth and twelfth form the first series lying one behind the other nearest the mid line; in the second series come the motor fifth, seventh, auditory, glosso-pharyngeal, vagus, spinal accessory, one behind the other, and sometimes a little overlapping; the third series consists of the three sensory parts of the fifth.

THE CIRCULATION OF THE BRAIN.

The two internal carotid and two vertebral arteries form the circle of Willis, and the branches from this are divided into two systems: the cortical supplying the cortex and subjacent white matter and the central or ganglionic, nourishing the basal ganglia.

The cerebral arteries are *terminal*, each ultimate branch furnishing pabulum to its own region and not freely joining with neighbouring vessels; the brain divided into vascular areas is therefore something of a mosaic. The cortical arteries ramify in the pia mater and are distributed to the gray matter of the gyri and white matter beneath; branches of these arteries join with one another, but in a varying, though seldom, great degree.

The *long* or medullary twigs penetrate to the white matter, whilst the short supply the gray cortex.

The anterior cerebral artery courses forward around the corpus callosum along the longitudinal fissure; its branches are the "anterior median group" of vessels *perforating* to the basal gan-

glia, and some to the orbital convolutions, the marginal convolution of the quadrate lobe and the corpus callosum.

The middle cerebral or Sylvian supplies: (1) the inferior frontal branch to the lowest frontal convolution; (2) the ascending frontal to the posterior part of the middle frontal and the greatest part of the ascending frontal gyri; (3) the ascending parietal to the ascending frontal partly and the ascending parietal chiefly, and also the superior parietal lobule; (4) a branch to the inferior parietal lobule; and one to the temporo-sphenoidal convolution.

The posterior cerebral artery furnishes blood to the occipital lobe chiefly its under-surface and to the under-surface of the temporo-sphenoidal as well as to the sensory *crossway* of the internal capsule, by means of perforating branches.

The central arteries all perforate perpendicularly and form six groups; the anterior median comes from the junction of the anterior cerebrals and feed the caudate nucleus; hæmorrhage from rupture of them may escape into the ventricles and cause death rapidly.

The posterior median group arise at the front bifurcation of the basilar artery, opposite the anterior median, and feed the inner faces of the optic thalami; this group, like the anterior median, is chiefly remarkable for their rupture causing bleeding into the ventricles. The antero-lateral bundle pierce the anterior perforated space and feed the corpus striatum, internal capsule and a portion of the optic thalamus. The largest branch is the "artery of cerebral hæmorrhage" and is called lenticulo-striate from its course first outside the lenticular nucleus and then forwards by the internal capsule to the caudate nucleus. The postero-lateral group feed the chief posterior part of the optic thalami and hæmorrhage or

thrombosis of them generally deadens the posterior limb of the internal capsule and sometimes the crus cerebri.

The Sylvian artery feeds, therefore, the motor area of the brain, both the basal ganglia and the cortex, and also the sensory as well as the motor speech centres of the cortex. The anterior cerebral feeds only a part of the motor centre for the leg (paracentral lobule) and the centre for the trunk muscles. The posterior cerebral artery feeding the sensory crossway, total hemi-anæsthesia may result from lesions of it.

The perforating arteries rupture more frequently than become blocked, which is the reverse of what happens in the cortical branches.

Deafness for words may be caused by blocking of the branch supplying the first temporo-sphenoidal convolution on the left side in right-handed people; obstruction of the branch going to the third left frontal in right-handed individuals causes simple motor aphasia.

Blockage of the lower half of the basilar artery causes paralysis of both sides of the face, both arms and both legs, with difficulty in respiration, cyanosis and asphyxia; the consciousness is lost entirely in deep coma.

Blockage of the upper half of the basilar artery does not cause cessation of breathing but produces the other symptoms of obstruction of the lower half.

Occlusion of the superior cerebellar artery may cause paralysis of the third nerve on the same side and of the limbs on the opposite side.

Obstruction of both vertebrals would produce the same effects as blockage of the lower part of the basilar, and obstruction of one vertebral would cause hemiplegia.

Arterial disease of the brain, whether atheroma, or syphilitic, or aneurysmal, may give headache,

giddiness, numbness and tingling in various parts with noises in the ears and flashes of light before the eyes—as premonitory or warning signs (molimina).

CEREBRAL VEINS AND SINUSES.

The veins on the cortex pass forwards and inwards towards the superior longitudinal sinus, and the flow of blood is therefore reversed in direction since the blood in the long sinus passes backwards. The sinuses are patent when empty of blood, being like rigid pipes. These facts and the existence of trabeculæ crossing the lumen of the sinus favour clotting of blood. The veins of the brain do not anastomose, but the sinuses are freely in communication with one another.

Swelling of the scalp may correspond in seat to thrombosis within and be a sign of the latter. As a vein passes from the nose through the foramen cæcum to the superior longitudinal sinus, epistaxis may occur from thrombosis of the long sinus. Another emissary vein goes from the lateral sinus to the mastoid cells and a communication is thus established between the lateral sinus and veins of the scalp behind the ear; this explains the mechanism of thrombosis of the lateral sinus in disease of the mastoid cells or temporal bone. The free anastomosis of the ophthalmic vein with the facial prevents engorgement of the retinal veins when the cavernous sinus is blocked.

ANÆMIA AND CONGESTION OF THE BRAIN.

That anæmia and congestion of the brain are competent to produce various cerebral symptoms must be admitted, but in cases diagnosed as cere-

bral anæmia or congestion, we must confess that the symptoms may be equally well explained on the supposition that there exist faulty modes of working of the nerve cells themselves.

To assume the existence of anæmia or congestion puts the difficulty of explanation further back, because we should then require to know on what cause the vascular disorder rested. Further, nervous action must be allowed to be capable of generating vascular disturbance. Careful inquiry into the previous and family history of so-called cases of cerebral congestion will reveal the existence of definite neuroses. To me it seems much more satisfactory in such cases to regard the genuine nervous protoplasm as the structure whose functions are imperfectly performed.

Hyperæmia and anæmia must play their parts in producing the symptoms of meningo-encephalitis, hemiplegia, tumours and other organic diseases of the brain; for it is impossible that such vascular disturbances could be absent in any cerebral affection—where living capillaries exist their life is inseparably bound up with the life of the living tissues, a mutual bond of union which can only be broken by the pathologist's imagination.

Headache, giddiness, loss of consciousness, tonic and clonic spasms (convulsions), noises in the ears, deafness, flashes of light before the eyes, blindness, curious sensations in various parts of the body, paralysis of various parts of the body, mental excitement or depression, loss of moral control, are symptoms of cerebral disorder, and many of these symptoms may be combined in various ways giving curious clinical pictures (symptom-complex of the Germans). Such symptoms may be ascribed to anæmia and congestion. For the nervous symptoms of pure general anæmia the article on this malady may be consulted.

CEREBRAL HÆMORRHAGE.

Extravasation of blood into the brain is of frequent occurrence, both as a solitary condition and as accompanying other diseases. A rise in the blood-pressure and disease of arteries generally combine to produce the hæmorrhage. Miliary aneurysm of small arteries is a common form of arterial disease leading to hæmorrhage. Atheroma of the arteries forming the circle of Willis may or may not be present.

The perforating arteries (*see* p. 321) come off at right angles to their main trunks, and thus are almost in a straight line from the heart; such an arrangement must act as a physical aid to hæmorrhage, since it exposes these arteries to the brunt of the heart's excessive action; this mechanical element may also account for the disease of the walls of the arteries, since undue tension undoubtedly causes arterial change. Hæmorrhage from the lenticulo-striate artery (*see* p. 322) first strips off the external capsule from the lenticular nucleus and the subsequent events depend upon the rapidity and amount of bleeding; pressure is exerted centrifugally by the extravasated blood, so that the claustrum and island of Reil bulge outwards, and the lenticular nucleus and internal capsule inwards.

A large smart hæmorrhage tears through the white substance and ploughs up the lenticular nucleus, the blood may thus escape into the lateral ventricle, and be diffused widely there and also into the base of the brain and beneath the membranes.

Hæmorrhage may occur into the pons; into the cerebellum; into the caudate nucleus and so into the lateral ventricle; into the pia mater and thus

over the surface of the brain, and this without there being hæmorrhage into the substance of the brain.

The blood soon coagulates, and if the patient lives, this clot causes irritation like any tumour, so that around it reddening may be noticed if death occurs in a day or so, or yellow softening if death is postponed for a longer time. If death does not occur, the clot may become disintegrated and absorbed, a yellowish rusty coloured cicatrix, or a cyst containing serous fluid and lined by a membranous wall, may alone remain. The rusty colour is due to granules and crystals of hæmatoidin.

As a rule, hæmorrhage into the ventricles is rapidly fatal.

Chronic interstitial nephritis, the granular kidney, is very commonly associated with cerebral hæmorrhage. And this change is intimately related to the "arterio-capillary fibrosis," which indeed may be regarded as the pathological cause of the "miliary" aneurysms (*see* p. 114, Hæmoptysis). Men are about four times more liable to cerebral hæmorrhage than women. Thus cerebral hæmorrhage is brought into close relationship with gout, plumbism, granular kidney, and hypertrophied heart, as predisposing causes of it; the exciting causes include sudden efforts, violent emotions, straining at stool, immoderate laughter, and any cause capable of suddenly exciting the circulation.

Arterial disease leads to impaired nutrition and cerebral softening, which must likewise diminish the natural support of vessels and so aid the production of hæmorrhage.

At first the boundaries of the clot consist of ragged brain-tissue, but as time goes on the boundaries become smooth and more defined, and if a cyst results its inner wall may be quite smooth and even. Similar changes occur around suppur-

ation of the brain and of the lung and liver. The cyst-wall is composed of imperfect fibrous tissue, the product of the inflammation excited by the clot.

Meningeal hæmorrhage and hæmorrhage into the brain substance are not uncommon in the newly born when labour has been prolonged and difficult (*see* Spastic paralysis).

Cerebral hæmorrhage may be attended with fever, but at first a slight fall of the temperature of the body may be noted—even two degrees Fahrenheit, and this fall may increase if death is very rapid. If life is prolonged the temperature rises even to 101°, and may so remain for days. In other cases, more especially in pontine hæmorrhage, the initial fall is soon followed by a rapid rise which may reach the hyperpyretic degree. This is regarded as of very serious prognosis.

Hæmorrhage anywhere in the body generally causes a fall in temperature; the rise occurring in brain cases must be attributed to a direct influence on the thermogenetic apparatus. The other effects of hæmorrhage will be discussed under Hemiplegia and Apoplexy.

CEREBRAL EMBOLISM.

The source of the embolus is usually the left side of the heart. Vegetations on the mitral or aortic valves may be simple, or malignant—as in ulcerative endocarditis. Fragments from ulcerated valves may excite arteritis, and the formation of an aneurysm of the artery at the part obstructed. Thrombosis in the left auricle or its appendix may be the source of an embolus even when there is mitral stenosis also; or the thrombus may form in the left ventricle between the fleshy columns; or emboli may be derived from atheromatous disease

of the aorta. The Sylvian artery is most commonly obstructed, the vertebrals much more rarely. The left Sylvian artery is said to be more frequently blocked than the right, and this has been attributed to the mode of origin of the left carotid artery from the aorta. Young adult females are said to furnish more examples than other ages and the male sex.

CEREBRAL THROMBOSIS.

ATHEROMA, calcification of arteries, and a feeble state of circulation are each potent causes of arterial thrombosis, which under such circumstances appears to be more common in the vertebrals and basilar than in the carotids. Syphilitic disease most frequent, though by no means confined to the carotids, may obliterate the lumen of arteries with or without causing thrombosis.

Atheroma makes the arteries wide and pouch-like; syphilitic disease makes them narrow, thickened and cordlike, and tends to occlude their lumen. Atheroma affects the arteries pretty generally, and the larger ones more than the smaller branches.

Minute calcified arterioles are sometimes seen to stand up like bristles on cutting through the brain. The syphilitic disease begins as an endarteritis between the endothelium and the elastic fenestrated membrane, which latter may be destroyed by the invasion of the small round-celled growth.

Obstruction of arteries leads to certain histological effects if a collateral circulation does not soon occur; experiments on animals prove that brain tissue cannot be deprived of its blood supply for more than two hours or so without softening ensuing. The tissues may become diffluent and look like milk, or the consistence may be less

diminished than this. A gentle stream of water washes away brain tissue which is morbidly softened. The colour of the softened tissue is usually whitish, like cream or milk. Red, white, and yellow softenings are described, but the distinctions are not of any importance. The presence of blood pigment determines the colour; yellow being due to the well-known change occurring in hæmoglobin; in white softening hæmoglobin or hæmatoidin is absent.

Softening of the walls of the ventricles in hydrocephalus is usually white, that around tumours yellow, that of acute encephalitis red; the necrosis due to embolism and thrombosis is often yellow because of the escape of blood pigment from the capillaries (*see* Embolism). The softened tissue presents the corpuscles of Gluge or compound granulation corpuscles, with drops of myelin and degenerated nerve fibres. Fatty degeneration of the cells of the neuroglia or of the nervous cells, is the probable source of Gluge's corpuscles, though all other histological elements have been called into requisition to explain their origin. The changes in the softened area may be the same as those resulting from hæmorrhage—cicatrix or cyst.

HEMIPLEGIA.

As in all true cerebral diseases the most specialised, the most volitional acquisitions are lost. The hand movements are most paralysed in hemiplegia because they are represented chiefly in the opposite cortical motor area; this part of the brain only had been educated for the performance of the specialised manual movements. Many movements are equally well performed by the motor region of either hemisphere, such are movements involving the use of muscles on both sides of the body, *i.e.*,

swimming, walking, running, standing, but even these movements are impaired during the early days of a hemiplegia.

In genuine cerebral hemiplegia there is loss of the most volitional movements of that half of the body which is opposite the lesion causing the hemiplegia.

As a rule in the very common form of hemiplegia due to lesion about the internal capsule, sensation and the special senses are not affected.

Careful examination shows besides the want of volitional movement of the mouth and tongue, arm and leg on the paralysed side, that there is a defect in the *volitional* use of the trunk, hip and shoulder muscles and the muscles of the upper part of the face. In ordinary breathing the chest moves equally on the two sides, but if the patient makes a deep voluntary inspiration the paralysed side will be noted to be moved less than the sound side.

It is astonishing how common is this variety of hemiplegia. In some cases recovery takes place to a great extent but is seldom perfect in degree. Probably there is mere interference with the functions of the motor part of one internal capsule in those cases which recover markedly.

Hæmorrhage from the lenticulo-striate artery is a very common cause. Sometimes the motor fibres of the internal capsule are so damaged that their restitution never occurs during the life of the patient. Of course when the damage is great descending degeneration of the fibres takes place, and this may be traced through the crus, pons, decussation and spinal lateral column.

If the lesion should damage fibres of the posterior third of the posterior limb, hemianæsthesia would result. And in some cases in which the leg is most paralysed, probably the clot compresses the motor path rather further back than in the commoner hemiplegia.

Aphasia generally occurs if the hemiplegia is right sided and the patient right handed.

If the arrangement of the fibres in the internal capsule be understood these varieties can be easily explained.

The hindmost extremity of the internal capsule gets its blood supply from the posterior cerebral artery.

The order of recovery of movements is important; the least paralysed recover first; the last movements to recover are the extension of the wrist and fingers in the arm and the dorsal flexion at the ankle. When the leg is most paralysed the order of recovery is face, arm, leg. Usually the face and tongue first, then the leg recovers, and the hand last.

In children recovery is often more complete, but in this infantile hemiplegia the limbs often fail to grow and the mind may be defective; aphasia, however, is often transitory, and sensation, if lost, is soon recovered.

The cutaneous reflexes are often diminished on the hemiplegic side, whilst the deep or tendon reflexes are often increased. The limbs may be limp or stiff.

Rigidity, which is stiffness, may amount to contracture. If it comes on with the hemiplegia or follows it within a day, the rigidity is called "initial"; this is explained as the effect of irritation of the motor fibres. If the rigidity comes on within a few days it is called "early" and is believed to depend on inflammation. Late rigidity is the phrase employed when some weeks elapse before rigidity appears, which is then believed to be due to descending degeneration.

In these cases the knee jerk is exaggerated, the supra-patellar tap may be obtained, and even rectus clonus; ankle clonus and front-tap contraction also may be present. When months have

gone by structural changes develop in the muscles, tendons and ligaments, leading to permanent contractures. Curiously, before this has occurred, faradisation of the weaker muscles (extensors and abductors) causes relaxation of the flexor and adductor spasm.

In the paralysed limbs trophic, sweating and vasomotor changes may occur. These are said to be most often seen when the right hemisphere is the seat of the lesion. The hemiplegic walk is rather characteristic: as the muscles in the front of the leg are most paralysed, the foot is dropped and in order to clear the ground the leg is swung outwards; very rarely is the knee overflexed to effect the same purpose.

Besides rigidity many disorders of movement may be noted after hemiplegia, especially when recovery is imperfect—post-hemiplegic chorea, athetosis; the latter name being given when the movements are slow and constant, consisting of successive flexion and extension of the fingers.

Monoplegia is the name given to palsy of one limb due to brain disease. Generally the cortex is the seat of the lesion, but the fibres proceeding therefrom may rarely be alone damaged.

The localisation of the centres will explain those paralyses which are named brachial, crural or facial monoplegia. We may have also brachio-facial or linguo-facial varieties.

CONGENITAL SPASMODIC PARALYSIS—CONGENITAL CHOREA.

Perhaps in all cases of spasmodic paralysis the pyramidal tracts are damaged. The cases are of common occurrence; the symptoms though always of the same kind, vary immensely in extent and

degree; spastic paraplegia is common. The causes may be intra-uterine or may be in action during parturition. More or less impairment of mind and morals may co-exist. Many cases have therefore to be sent to Darenth or Earlswood. Besides the tonic spasm or rigidity there may be clonic spasm, and the voluntary movements may be impaired by the involuntary tonic and clonic spasms. Of course there is always weakness—paralysis—of voluntary movements, the grasp may be in abeyance or may be very slight.

The lesion which damages the pyramidal tract or which prevents its proper development, frequently occurs in the motor cortex, but may occur in any part of the pyramidal tract. Sometimes the motor convolutions and pyramidal tracts are undeveloped; or they may be atrophied and sclerosed by hæmorrhage or by chronic meningitis, or by syphilitic arteritis, or by tumour. Porencephaly consists in absence of convolutions, and this developmental defect may go on to the extent of placing the lateral ventricle in communication with the sub-arachnoid space. Cases occurring in parturition are probably always due to hæmorrhage into the gray and white substance; this leads to atrophy of brain and want of development of the pyramidal tracts, which are only beginning to develop at birth.

INFANTILE HEMIPLEGIA.

This does not differ much from hemiplegia in adults, but its pathogeny is still a moot point. Thrombosis of cortical veins, thrombosis of Sylvian artery, embolism, hæmorrhage and acute inflammation in the motor region, are held to be the mechanism by different observers; perhaps each

mechanism may be operative in different cases. The hemiplegia frequently begins in the midst of perfect health, with convulsions, limited to the side afterwards paralysed, and high fever.

After scarlet fever and diphtheria it is probably due to embolism from cardiac thrombosis; also after such exhausting diseases as noma vulvæ. Further, hemiplegia of embolic origin from valvular disease certainly occurs in children as in adults.

Doubtless hæmorrhage is sometimes the mechanism when hemiplegia arises during a severe paroxysm of whooping cough.

Epileptic convulsions are very prone to occur after hemiplegia whether congenital or infantile.

In the bulk of the cases the paralysis tends to lessen, but the growth of the leg, arm and scapula is often much less than natural. Talipes equinus may result partly from this shortening, and partly from the over-action of the calf muscles.

The treatment consists in getting the child to use the limbs as much as possible, and whilst performing various movements some resistance to their accomplishment should be opposed. Screwing a knob of a bed-post on and off is good movement for exercising the fingers; or twisting round the roller of a jack-towel.

DIAGNOSIS AND CAUSES OF HEMIPLEGIA.

To find out the cause of a hemiplegia is often difficult. As a rule in cases due to hæmorrhage consciousness is lost. Most cases of embolism occur in females with heart disease, which is very frequently mitral stenosis; consciousness is often not lost in cases of blockage of the middle cerebral or one of its branches by an embolus. In

young or middle aged adult males, most generally syphilitic thrombosis of the middle cerebral, explains the sudden development of hemiplegia. In cases of Bright's disease occurring in advanced life, the hemiplegia is usually due to hæmorrhage, the circulation being carried on at high pressure and the heart is hypertrophied. But in some cases the hemiplegia is due to thrombosis occurring in an atheromatous artery.

Hemiplegia developing during a state of great debility such as in typhoid fever, diphtheria or puerperal fever, is most often due to thrombosis, the effect of alteration of the blood and of the weakened force of the circulation. But under similar circumstances thrombosis may occur in the cavities of the heart, from which clotting, emboli may proceed when the heart recovers from its dilatation.

Vessels which are the seat of atheroma or syphilitic disease, cause a defective blood-supply to nervous tissues, and this is the reason why premonitory symptoms—headache, giddiness, tingling and numbness in various parts of the body—may be noted in the previous history of cases of hemiplegia due to those forms of arterial rupture or obstruction which are consequent upon atheroma and syphilitic disease. As a rule, such premonitory symptoms do not precede hemiplegia due to embolism, or thrombosis resulting from altered blood state.

In sudden hemiplegia, conjugate deviation of the eyes makes the patient look towards the sound side of the body and towards the lesion in his brain (*see* p. 315).

"Ingravescent apoplexy" is so-called when the coma is developed slowly and gradually deepens as the hours go by. At first a slight loss of consciousness, "cerebral surprise," may occur and from this recovery follows. It was long ago ob-

served that sudden deprivation of sense and motion was seldom caused by cerebral hæmorrhage; the patient merely feels queer or looks faint at the very onset, and from this condition of slight collapse he may recover so far as to be able to walk or continue doing what he was engaged upon. The gradual improvement in the circulation leads to further hæmorrhage, and to gradual loss of consciousness, so that his replies to queries become slow and heavy until mind and motion are completely lost.

Sometimes vomiting, or a cold sweat, or a rushing sensation to some part of the body, herald the approach of apoplexy or rather is the first sign of it. Most likely the first symptom is due to the shock or concussion of some part, if not the whole of the brain, and this symptom is then a pure neurosis, not the effect of irritation or destruction of a localisable part of the brain. It cannot be too well remembered that neuroses frequently attend organic diseases. As examples of this may be mentioned some cases of hemiplegia due to tumours, and some cases of aphasia due to hæmorrhage.

Apoplexy in cerebral pathology signifies sudden loss of consciousness, and is most often due to a large hæmorrhage within the cranium, but a correct notion of known cerebral physiology will suffice to teach that apoplexy thus defined may be due to a great many causes. Any sudden influence may jar the nerve cells of the cerebral cortex so as to devitalise them just as we demagnetize a magnet by a sudden shock. Small wonder will it be, to the properly instructed in physiology, that embolism or thrombosis, concussion or laceration, may overthrow the mutual balances of nervous energy on the maintenance of which, consciousness, like any other nervous function, must depend.

Congestive, simple and serous apoplexies have

been recognised in the past, but cases so designated are of doubtful nature. Many poisons exist which are capable of rapidly abolishing consciousness, and these poisons may be generated within the body as well as in wounds and inflammatory foci.

CEREBRAL AND SPINAL MENINGITIS.

The symptoms of meningitis are mainly due to irritation and destruction of those parts of the nervous system which happen to be the seat of meningitis. Doubtless some symptoms are simply neuroses excited in the manner before mentioned. Pachymeningitis signifies inflammation of the dura mater; leptomeningitis of the pia mater. The arachnoid cavity has no real existence. In medical practice pachymeningitis rarely occurs, and when it does, syphilis is the cause as a general rule; alcohol is also an accredited cause.

The following forms of meningitis are acute in their nature:

Purulent and tubercular meningitis affect the pia mater almost exclusively, but tubercles may be seen on the visceral surface of the dura mater, of the cord and brain.. The epidemic cerebro-spinal meningitis is apt to be purulent. The commonest cause of purulent meningitis in medical practice is disease of the bones of the ear, but any bone disease may be its cause. A case of pyæmia may exhibit purulent meningitis.

Tubercular meningitis is the commonest of all brain diseases, especially so in children. Infants a few months old are liable to a simple form of meningitis—"posterior meningitis"—which affects the posterior parts of the base of the skull, and is sometimes idiopathic, sometimes syphilitic, some-

times secondary to otitis, without bone disease. Meningitis is an affection of serious character. Erysipelas about the face and head may sometimes cause meningitis and sometimes symptoms like those of meningitis, so may the acute specific fevers, but definite evidence of meningitis is often wanting at the post-mortem examination.

Morbid Anatomy of Acute Meningitis: gelatinous, turbid, or purulent infiltration of the loose meshes of the pia mater most abundant in the base of the brain and along the Sylvian fissures; the sulci elsewhere may rarely present a considerable infiltration. Accumulation of fluid within all the ventricles of the brain; the fluid is usually turbid and contains leucocytes. The extreme front apex of the upper surface of the cerebellum almost always exhibits thickening of the pia mater, which thickening is evidently in direct continuity round the cerebral peduncles with that of the base; most likely this thickening presses on the vena Galeni and may thus be the cause of the ventricular dropsy (acute hydrocephalus).

When there is much hydrocephalus the surface of the pia mater often feels sticky and dry, and the sulci tend to be obliterated owing to the fluid pressure. The ependyma of the ventricles often presents a granular appearance as if dusted over with minute transparent grains of sand ("sha-green" appearance). Very frequently there is much white softening of those parts of the brain which bound the ventricles; the septum lucidum and fornix may be found to be ruptured on opening the ventricles.

In tubercular cases the characteristic granulations are found, these are most abundant on the branches of the Sylvian arteries, but they may be detected on any part of the surface of the brain; sometimes they are localised to one motor area on the convex surface (Jacksonian epilepsy may

result), they often show signs of caseation. Probably their distribution is always determined by arteries, the belief, not shared by all, being that the tubercle bacilli get into the arterial blood stream of the brain. Sometimes tubercles are present without any inflammatory effusion, but the symptoms during life appear to have been the same. The cerebral tissues often present changes to the microscope: indistinctness of nerve cells and fibres, granules of myelin, leucocytes, and other evidences of softening.

Symptoms.—In children a history of ill-health, may be obtained prior to the development of serious illness. The symptoms of this prodromal stage may be one, few or many, and they vary in different cases; headache, lassitude, fretfulness, altered temper, capricious appetite—symptoms so vague that their cause might be assigned to disease of the belly or thorax. In some cases in children and in many cases in the grown up, no premonitory signs have been observed.

The symptoms of meningitis have usually been arranged into three categories representing three stages, but in practice the variations of the clinical course of the disease are astonishing.

The first stage or stage of irritation is present when the following symptoms are observed:—

Fever of an irregular type but not usually higher than 102°; the pulse may be much slower or much faster than is required by the temperature (this irregularity of pulse recalls that of acute yellow atrophy of the liver and many a toxæmia); when the pulse is slow vomiting is common; the respiratory rhythm may present similar irregular changes, and the breathing may be accompanied by a moan or groan; the bowels are constipated even when there is no vomiting. Not only is there evidence, as just given, of disturbance of the functions whose chief seat is the

floor of the fourth ventricle, but mental, motor and sensory symptoms are present; these are doubtless due to disordered action of those regions of the brain which subserve mental, motor and sensory functions. Consequently what has been written concerning localisation of function in the brain can be applied in the explanation of the signs of meningitis. The signs are partly due to the tubercles, partly to the inflammatory products; both these structures may produce symptoms by their direct irritative or destructive effects and also by their influence on the circulation, for it is around the vessels that tubercles and inflammatory products do mostly congregate.

Severe headache, tender scalp, fretfulness, restlessness, sleeplessness, twitchings, tremors, squinting, contracted pupils, clonic and tonic spasms and losses of consciousness (epileptiform attacks) are amongst the chief symptoms.

Transient paralysis, such as ptosis, hemiplegia, may be noted and may be simply neuroses partly induced by the presence of the organic disease, but still not directly dependent on it; very likely other fugitive signs—squinting, twitchings, tremors, epilepsy, occurring in the course of the case, may be likewise dependent on mere functional changes in the nervous elements. The twitchings may be indistinguishable from those of chorea.

In the middle or transitional stage the "irritative" phenomena tend to subside; drowsiness, low temperature, persistently slow and irregular pulse, irregular respiration and apathy, supervene. The pupils become dilated, optic neuritis may appear if it had not previously developed; the "hydrocephalic cry" may be noted; the belly may become concave or boat-shaped and the *tache cérébrâle ou meningitique* (of no diagnostic value) may be marked.

The last stage is a further development of the

drowsy stage. Coma and convulsions are the most characteristic symptoms. The pulse and breathing become rapid again but very feeble: Cheyne-Stokes' breathing may be noted—it consists in a series of respirations, first shallow then increasingly deep, and followed by a period when no breath may be taken for even half a minute. The typhoid state is developed with its dry brown tongue, sordes on the teeth and great prostration; there may be no fever or the temperature may rise to the hyperpyretic degree as death closes the case.

Remembering that brain symptoms are common in severe illnesses and that definite signs of local paralysis are so infrequent in meningitis, no wonder need be entertained that a correct diagnosis is sometimes most difficult, if not impossible. In children, too, belly and chest disease cause remarkable cerebral phenomena; whence the terms cerebral pneumonia and "hydrocephaloid"—spurious hydrocephalus—in severe diarrhœa and after severe operations.

In **simple meningitis** the number and combination of the symptoms may be as variable as in the tubercular variety—a differential diagnosis is sometimes impossible between the two affections. In typhoid fever constipation may occur instead of diarrhœa, and the belly may be retracted instead of tympanitic; tuberculosis often complicates meningitis, and then a certain amount of splenic enlargement may be present, thus simulating typhoid fever. Genuine rose spots and pea-soupy stools do not occur in tuberculosis. The concurrence of delirium and headache suggest meningitis, not fever.

The duration of tubercular meningitis varies, but many cases die within a fortnight of the commencement of insignificant signs.

The presence of ear disease is, of course, in

favour of purulent meningitis; of phthisis or scrofulous scars, of tubercular meningitis; in infants under two years of age tubercular meningitis is decidedly rare.

If there be retraction of the head, vomiting and other signs, in infants a few months old, "posterior" simple meningitis is most probably present. Epidemic meningitis is diagnosed when an epidemic is prevailing; sporadic cases may exactly simulate other forms of meningitis.

In **chronic meningitis** in children a history or other evidence of syphilis may help the diagnosis. A boy, at the age of twelve months, had hydrocephalus, this disappeared under mercurial treatment, in twelve months; the skull was natiform; at the age of three he became blind and syphilitic choriditis was discovered; he recovered somewhat and appeared to be doing well, when six weeks before he died left hemiplegia appeared, three days before he died he became aphasic and developed right hemiplegia. At the autopsy the dura mater was found to be thickened and adherent all over the brain to the pia mater, which was much thickened and contained much œdema in its loose meshes; the arteries showed well-marked syphilitic change; many convolutions of the brain were atrophied and sclerosed. This case was therefore one of chronic meningitis, arteritis, cerebral atrophy and sclerosis (*see Path. Trans.*, 1889).

Syphilitic meningitis in adults also occurs, the chief symptoms are paralysis of cranial nerves of irregular distribution, and occurring frequently on both sides of the body; severe headache and giddiness are common. The membranes are found to be thickened at different parts about the base of the brain; gummata may be found on the cranial nerves; even aneurysms, arteritis and thrombosis of arteries may be discovered.

In one man, aged 30, the pachymeningitis ex-

tended continuously from the dorsal region of the cord along the cervical and without any break over the medulla to the lowest third of the pons. The symptoms lasted fifteen months and began with numbness and loss of power in both arms; the arms were much paralysed and wasted, but the faradic reaction of the non-wasted muscles was good; severe pains about the shoulders, anæsthetic areas on the arms; some weakness of the legs only appeared three months before death; headache, vomiting, and optic neuritis with retinal hæmorrhages, were the main symptoms; there was no tumour in the brain; the cervical cord and medulla were swollen and semi-fluent, not diffluent, this being probably due to impairment of the blood supply resulting from the disease: the dura mater could not be separated from the pia mater over the cervical region of the cord.

It is not always possible to diagnose abscess of the brain from purulent meningitis; nor crude tubercles or other "coarse" brain disease from tubercular or simple meningitis. Cases of tubercular meningitis have been treated for hysteria during life. Rarely meningitis has begun its clinical course with hemiplegia, with epilepsy, with signs of delirium tremens or even with those of uræmia.

Treatment.—A cool, dark, well-ventilated apartment; fluid, bland, nutritious diet like that used in fevers; ice-bags to the shorn scalp; tepid sponging of the surface of the body; abatement of restlessness by bromides, chloral, hyoscyamus; stimulants when prostration becomes marked; leeches behind the ears if there be much cerebral and circulatory excitement; iced or effervescing drinks to relieve vomiting; saline purgatives if the diagnosis is not doubtful—constitute the general treatment of tubercular and simple meningitis. Mercurial inunction may be used with advantage

in the syphilitic variety; it is also used by some physicians in other cases; it may be combined with iodides; both drugs are believed to do good by promoting the absorption of inflammatory exudation.

THROMBOSIS OF CEREBRAL SINUSES.

Disease of the temporal bone, malignant carbuncle, injury to the skull, may cause suppurative thrombosis of the intracranial venous sinuses. Besides an adhesive thrombosis may occur in marasmus, especially in infants after severe inflammatory diarrhœa—Marantic thrombosis.

Rigidity of neck, trunk and limbs, nystagmus, ptosis, squinting, facial paralysis, convulsions and coma may be the symptoms. The marasmus causes the fontanelle to be depressed. In adults it may be due to enteric and puerperal fever. The diagnosis is often very difficult. The treatment should consist in giving more nourishment and a mixture of ammonia and ether.

HÆMATOMA OF DURA MATER.

This affection consists in the development of superimposed layers of membrane on the inner surface of the dura mater; when recent the layers are soft and vascular, but when ancient they are tough, white and fibrous. Their probable origin is from actual hæmorrhage into the subdural space; they are often bilateral; the membranes are believed by some to result from condensation and organisation of blood clot; by others, the membranes are believed to come first and the blood is extravasated from the thin-walled capillaries (pachymeningitis hæmorrhagica). The layers are often so

arranged as to form cysts, and these may enclose a serous fluid and then constitute the affection known as hydrocephalus externus. Alcoholism, syphilis, cerebral atrophy and general paralysis of the insane are associated conditions, perhaps causative. The convex surface of the brain is the commonest site of this affection which is most frequent in old males.

Without causing the tough-walled cysts of the ancient hæmatoma, many diseases have been accompanied by hæmorrhages in the same part of the meninges: pernicious anæmia, injuries, whooping cough. The diagnosis is exceedingly difficult because characteristic symptoms are wanting; apoplexy and epileptiform attacks have been noted with signs of cerebral compression—slow full pulse, contracted pupils and slight hemiplegia.

INFLAMMATION OF THE BRAIN.

Cerebritis or encephalitis in its most diffuse and extensive form is probably responsible for many of the symptoms of meningitis, so that to separate the two diseases is not to be warranted on clinical nor pathological grounds; the more so when it is remembered that the gray cortex derives its nourishment from vessels which ramify in the pia mater before being distributed to it.

Local irritation and encephalitis may be noted around tumours, and occurs to the naked eye as a yellowish gelatinous-looking zone, which is one form of yellow softening, and the meninges may present some thickening due to irritation and inflammation by a tumour.

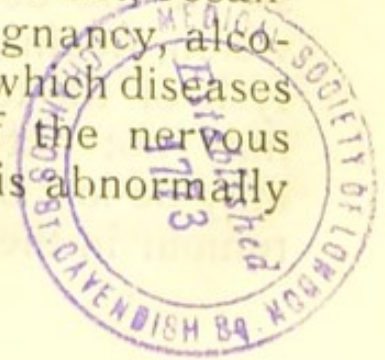
Suppurative cerebritis may occur in the form of many abscesses, as in pyæmia, or the abscess may be large and simple; this solitary abscess may occur from ear disease, from empyema or bronchi-

ectasis, and from other causes; these forms of suppuration recall those of the liver. Abscess of the brain often causes the symptoms of a tumour; the temperature of the body may be persistently low throughout the case (*see* p. 351).

TUMOURS OF THE BRAIN AND MEMBRANES.

Headache, vomiting and optic neuritis, with or without impairment of vision, are the symptoms of intracranial tumour and of meningitis; granular kidneys may also cause the same symptoms. Very rarely indeed does this combination of symptoms result from any other causes. The headache of cerebral tumour is very severe in character, and is the chief complaint made by the patient, though attacks of vertigo may also have been noticed. The headache is often attended with vomiting, and indeed it often seems as though the severity of the pain caused the vomiting; this circumstance may be remembered together with the generalisation that any severe pain may cause vomiting, sweating and faintness; the three colics afford examples of this concurrence of signs, and it is often noted that vomiting supervenes when a gastric pain (gastralgia) is at its height; this indeed may happen when there is not any ulceration or catarrh of the stomach.

The vomiting is not produced by the mere taking of food, and, as a matter of fact, it occurs sometimes in the morning before breakfast, recalling in this respect the vomiting of pregnancy, alcoholism and Bright's disease—in all of which diseases it may be assumed that the state of the nervous centres, on which vomiting depends, is abnormally irritable.



Constipation is a common symptom of tumour of the brain as well as of other *coarse* diseases of the brain and cord.

Convulsions or mere loss of consciousness or clonic spasms are of frequent occurrence in cerebral tumour; the occurrence of epileptiform convulsions—Jacksonian epilepsy (see p. 306)—indicates disease affecting the motor area of the opposite side of the brain. Various disorders of mind may be present, but frequently the intellect is undisturbed till the final stage is reached, when coma and convulsions often terminate the case.

The other symptoms of cerebral tumour depend largely upon its situation, and if the few facts bearing on localisation of function be thoroughly grasped there will be no difficulty in understanding what is known on the subject.

A tumour of the posterior or anterior parts of the brain very often does not give rise to symptoms indicative of its situation. It will readily be understood that perturbations or loss of function of the special senses and common sensation, and paralysis or irritation of the various parts of the body may result from cerebral tumour. Hemiplegia is not uncommon and may be due to the direct effect on the motor path, the tumour damaging or pressing on the motor centres or fibres, and it may be due to a mere neurosis complicating the tumour, *i.e.*, not due to any destructive or compressing mechanism; the former kind is perhaps most common and develops gradually, the latter often appears suddenly.

There may be inequality of pupil, ptosis, paralysis of the ocular muscles or of the face, double vision, deafness, weakness of the masseters, paralysis of the tongue or palate, and the vocal cords may not act perfectly. The superficial reflexes may be lost on the side of the body opposite to the tumour in the brain. Although optic neuritis may

occur with any tumour in any part of the brain, still it occurs most commonly with a tumour *in* the brain substance and especially in the cerebellum. A paralysis involving the cranial nerves about the base of the brain and not accompanied by paralysis of the limbs, of course indicates that the tumour is outside the brain in the membranes. If the limbs afterwards become weak on both sides this would argue that the pons was being compressed or invaded or otherwise diseased.

It will be gathered that a tumour may exist in some parts of the brain and give rise to no symptoms; the necropsy of children has often exhibited crude tubercle in the cerebellum which was unsuspected during life. In one case of congenital idiocy there was a tubercular tumour the size of a Tangerine orange in the right parietal region, but during life the only sign of brain disease was the idiocy with a curious shape of the head. If the reader has fully grasped the position of our present knowledge, he will not be surprised to learn that cases of cerebral tumour may suddenly succumb in a few days from convulsions and coma, there having been no sign of ill health previously.

As a general rule the temperature of the body is not raised by the mere presence of a cerebral tumour; but a tubercular tumour is so often associated with other lesions that the temperature chart may present febrile periods. A tender spot of the scalp, discovered by percussion of the cranium, may or may not be situated immediately over the tumour. The headache may be localised to a spot over the seat of the tumour, but often the headache is referred to the forehead or it may be generalised.

Tubercular and syphilitic tumours are the most common forms of intra-cranial tumours; gliomata are also common; sarcoma and cancer are much less common; hydatids do occur; aneurysms also;

fatty tumours and myxomata are very rare. Tubercular tumours are most common during early life; gummata occur chiefly during the active period of adult life, from twenty to fifty. The gliomata are almost exclusively met with in the nervous tissues, they develop in the neuroglia and have a remarkable infiltrating tendency, invading the brain tissue in such a manner as to maintain the shape whilst they increase the size of the part affected; so that the line of demarcation between the glioma and the healthy tissue may be ill-defined. Sometimes the gliomata are very hard and much less cellular than usual, in which case they scarcely enlarge the affected part; indeed it may require the microscope to distinguish between them and patches of sclerosis. Hæmorrhages may occur into soft gliomata. The other tumours of the brain do not infiltrate but rather destroy the brain by direct pressure and inflammatory irritation. The amount of impairment of the functions of the nerve elements varies considerably; so that even with a large tumour there need not be a great derangement of function; this is very noteworthy in cases of glioma of the pons in which there may be for a long time but little weakness of the limbs and trunk; the truth is that the nerve cells and fibres can withstand a great degree of compression if this be very gradually applied; ventricular dropsy and tumours bear witness to this belief. A history of a fall or blow or other injury to the head is often obtained in cases of intra-cranial tumour, and it may well be that this influence may be one cause of the tumour.

The diagnosis of the nature of a tumour must be made on its association; a cancer, sarcoma or hydatid in another part of the body indicates a growth of the same nature in the brain; evidence of tubercle or syphilis should be thoroughly sought for; phthisical signs may be discovered in the

lungs, or in the belly, or in the testicles; or the history may suggest syphilis. In this connection a word on the importance of examining the skin, bones and the viscera, including the penis and the contents of the scrotum, may not be out of place. The diagnosis of the seat of the tumour rests on the evidence afforded by local, *i.e.*, focal symptoms.

Certain tumours affect certain parts of the brain more than others; the cerebellum and pons often present tubercular and gliomatous growths and the latter also gummata. Tumours giving signs indicative of a cortical seat are generally gliomata or gummata.

The number of tumours may be one or many. Tubercular tumours vary in size from a pin's head to a small orange. Chronic meningitis may simulate the signs and clinical course of a tumour. Alcoholic meningitis is most common on the convex surface of the brain; delirium of the alcoholic kind and headache are its chief symptoms; a slight optic neuritis may rarely be observed. Syphilitic meningitis is usually confined to the base, and its symptoms are much the same as those of a tumour with which it may co-exist; the case mentioned on page 344 proves that a differential diagnosis is impossible.

The treatment depends on the nature of the tumour; iodides are always administered; cortical tumours and others in accessible situations have been successfully removed.

ABSCESS OF THE BRAIN.

The symptoms are almost the same as those of a tumour—headache, vomiting, optic neuritis.

Stupor tending to coma is rather a prominent symptom, but of course by itself is insufficient for a differential diagnosis. Local or localising sym-

ptoms are more frequently absent than is the case with cerebral tumour, chiefly because the localising symptoms of disease of the tempero-sphenoidal lobe and of the lateral lobes of the cerebellum are unknown, and partly because of the indifference of the functional nervous tissues to gradual pressure, as already mentioned. The optic neuritis may be severe in cases in which symptoms pointing to the head are absent. A "latent stage" in the clinical course of cerebral abscess is one of its most remarkable features, another being the rapidity with which brain symptoms may appear and reach an alarming degree of intensity. Since abscess of the brain is secondary to ear disease, empyema, bronchiectasis, injury to the brain or other disease of the cranial bones, *e.g.*, orbit and nose, these primary conditions afford valuable guides to the nature of the cerebral symptoms, which are frequently slight in comparison with the size and seat of the abscess. The abscess may rupture into the ventricle or beneath the membranes. Many cases have been successfully treated by aseptic surgery.

CEREBRO-SPINAL SCLEROSIS.

A PATCH of sclerosis resembles a glioma in being an affection of the neuroglia. Both sclerosis and gliomatosis originate, therefore, in a tissue which is outside the functional nervous tissue. In consequence of this fact these diseases impede rather than annihilate the functions of the nerve tissues.

It may be mentioned again that some gliomata are so hard and cause so little enlargement of the affected parts of the brain, that at the necropsy it may be difficult to say whether the diseased area is sclerosed, or whether it is the seat of a hard glioma. It is possible that all stages between soft glioma and actual sclerosis may exist.

Atrophy of the true nervous tissues follows the sclerosis, but the reverse process obtains in some kinds of sclerosis—tabes dorsalis. Sclerosis is not uncommon in youth and early adult life.

The disseminated variety is so named because of the appearance of islets of sclerosed tissue occurring as rounded gray-red semi-translucent areas, of fairly well-defined outline, scattered apparently irregularly in the white substance of the brain or cord or in both organs. The causes of sclerosis and of gliomatosis are but little known. Exposure to cold and wet, anxiety, worry and syphilis are given as causes of sclerosis; injury and shock are antecedents both of sclerosis and gliomatosis. These sometimes result from typhoid fever and small pox, diphtheria and erysipelas.

As in sclerosis elsewhere, the microscope reveals an excessive number of nuclei and a mass of fine fibres denser in aspect than the fibres of normal neuroglia; spider cells may be seen; the walls of the vessels become thickened—a theory exists to the effect that all sclerosis starts from thickened vessels; the white substance of the nerve fibres first disappears and the axis cylinder persists a very long time.

The symptoms will depend on the situation of the sclerotic islets; generally the motor tracts are involved, and then weakness, tremor and rigidity are prominent symptoms.

Tremor of wide range occurring only on making a voluntary movement is a most important symptom of disseminated sclerosis.

Unlike paralysis agitans the tremor is not present during rest and sleep. In drinking a glass of water the jerky inco-ordination of the voluntary movement is well brought out.

The jerking and the weakness may be present in the arms, legs, tongue, neck and other muscles.

Nystagmus or clonic spasm of the ocular muscles causing oscillation of the eyeball is a common symptom.

There are usually few sensory symptoms; loss of muscular sense seldom occurs and in this respect the disease differs from tabes dorsalis. The signs of lateral sclerosis—weakness, spasm, increased knee jerk and ankle clonus—are often present.

The rectum and bladder seldom present any signs of impaired action. The mind usually does not suffer; headache and giddiness are not very uncommon. The articulation is peculiar, the syllables being unduly separated and accentuated—"staccato," "syllabic," "scanning" utterance.

Although sensation, the special senses and the mind do not suffer in the early periods, yet they may be affected at any period, though more commonly later than earlier in the course of the disease. The general tendency of the affection is to increase in extent and in degree; this increase may be very slow and there may be periods of actual cessation.

Even in the early stage an unnatural contentment of mind may be a noteworthy feature recalling the comfortable *bien être* of general paralysis of the insane—with which disease disseminated sclerosis has some points of contact.

The complication which is most dangerous to life is involvement of the medulla oblongata rendering deglutition difficult.

Trophic changes are rare: an increase of fat is the most common of them.

Treatment is not of much service: nervine tonics, electropathy, hydropathy and massage are recommended.

HYDROCEPHALUS.

The term is mostly applied to the presence of an excess of water in the cerebral ventricles.

External hydrocephalus is the phrase employed to denote an excess of water on the brain. The latter condition is seen in cases of general and local atrophy of the brain, and it may result from hæmorrhage (see p. 347).

Hydrocephalus is often congenital; or it may be acquired; it is most common in children. The head attains a very great size in this disease, the unossified sutures readily yielding to the hydrostatic pressure.

The circumference of the head may measure more than thirty inches. The sclerotic is often exposed above the cornea, chiefly because of the altered plane of the orbital plates. The superficial veins may be very large, palpation of them reveals a grooving of the bone in which they run. The face appears to be very small by contrast with the large size of the cranium.

The bodily functions are often but little impaired, sometimes great emaciation, at others remarkable fattening, may be observed.

Weakness and twitchings may be noted in the muscles; the knee jerks are usually exaggerated and ankle clonus may be obtained.

Convulsions are not uncommon, and mental development may be retarded, though it is striking how intelligent many of the children seem. Constipation is always present.

Some cases recover, but most terminate fatally during the first years of life.

If hydrocephalus develop after closure of the cranial sutures mental apathy and other obscure signs may occur; the diagnosis is very difficult,

though the history may afford some assistance, as, for example, in cases in which the patient has suffered from cerebro-spinal or simple meningitis.

The most important mechanism in the production of water on the brain is unquestionably closure of the foramen of Majendie, and this is most frequent in cases of posterior meningitis leading to agglutination of the posterior boundaries of the fourth ventricle to the under surface of the cerebellum.

Simple or syphilitic meningitis may cause such a form of closure, and in cases of tumour of the cerebellum the circulation of fluid between the cerebral ventricles and sub-arachnoid space may be prevented. In tubercular meningitis the vena Galeni are pressed upon; obstruction of these veins may be a part of the mechanism of hydrocephalus in other cases. Excessive secretion of cerebro-spinal fluid and diminished absorption of the same, caused by disease of the lining membrane of the ventricles, are alleged causes.

The fluid as a rule is clear and thin, containing no albumen. The quantity of fluid varies from a few ounces to several pints.

The ependyma may present a peculiar granular appearance (see p. 340). The convolutions become flattened and the sulci tend to be obliterated—the very opposite of what is seen in external hydrocephalus with atrophy of the brain and thickened meninges.

The bones of the cranium become much thinned.

Atrophy or œdema of the optic nerves may be detected by ophthalmoscopic examination.

Treatment.—Uniform pressure by strips of plaster or by bandaging, and paracentesis are practised. In syphilitic cases the inunction of blue ointment into the shorn scalp has removed the hydrocephalus in three of the author's cases.

DISEASES OF THE SPINAL CORD.

Diseases of the bones, membranes or nerve roots outside the cord are called extra-medullary to contrast with the term intra-medullary, restricted to diseases of the substance of the cord.

"System" diseases are those in which the lesion is strictly limited to tracts of the cord having definite physiological functions, *e.g.*, lateral sclerosis, posterior sclerosis.

SPINAL MENINGITIS.

This inflammation often complicates cerebral meningitis. Simple and tubercular forms may occur.

The intensity of the pain, which is increased by any movement, and often radiates into the limbs and round the trunk, proves its dependence on irritation of the nerve roots — "root pains." Muscular spasm of the trunk and limbs is another prominent symptom.

Increased reflex excitability and hyperæsthesia should be grouped together with the other two symptoms. Meningitis should be contrasted with myelitis with which it may be complicated.

In myelitis, instead of pain, spasm, hyperæsthesia and increased reflexes, there are—absence of pain, paralysis, anæsthesia and loss of reflex action. In polio-myelitis sensory symptoms are absent.

Recovery is rare; death is usually due to the myelitis; asphyxia from respiratory paralysis or asthenia after cystitis, often causes the fatal issue.

Meningitis may be very acute, but is more often subacute or chronic.

SPINAL ANÆMIA AND CONGESTION.

The remarks on cerebral anæmia and congestion are of equal application in this place. Probably cases of spinal anæmia and congestion are cases of neurasthenia, the effects of imperfect nutrition of the nerve cells and fibres. Feelings of numbness and tingling, or of heaviness in the legs are the commonest symptoms; the knee jerks are exaggerated and there may be ankle clonus. Any of the functions of the cord may be weakened or perverted. Great care must be exercised in the diagnosis; it is most necessary not to ascribe to functional nervous disturbance the symptoms of organic disease; that hysteria or neurasthenia may complicate organic disease cannot be too often insisted upon.

SPINAL HÆMORRHAGE.

This is much more rare than cerebral hæmorrhage, and almost always results from injury. The blood may be poured out into the subdural space, outside the dura mater or into the substance of the cord. In the last case myelitis may be associated, but whether primary or secondary there would appear to be some doubt.

The symptoms will depend on the seat of the hæmorrhage. When the blood is effused between the membranes, it will necessarily gravitate to the lowest part of the spinal cord; there will be signs of irritation like those of meningitis, and any paralysis that may ensue will be of the ascending order and due to compression of the cord.

The sudden development of the symptoms is the

chief characteristic of hæmorrhage in this, as in any other region.

If hæmorrhage develops in the cord, the symptoms resemble those of total myelitis—rapid loss of motion and sensation with paralysis of the sphincters. In one case of Clifford Allbutt's, the hæmorrhage occurred only in the gray cornua of the cervical region of the cord, death ensued from asphyxia, the signs were precisely like those of very acute anterior polio-myelitis.

At first the only treatment is absolute rest.

If death is deferred, trophic changes—bed sores and septic cystitis—may appear, or some lung complication may develop and cause death.

ACUTE MYELITIS.

The substance of the cord may be inflamed as the result of injury, of compression, and of extension of inflammation from meningitis. Like other visceral inflammations, myelitis has been ascribed to a chill from exposure to cold and wet, and there are grounds for thinking that myelitis may be due to infection by microphytes.

The consistence of the cord becomes lessened, and there may be signs of hyperæmia and sanguineous extravasations.

"Compression myelitis" is so-called if the softening results from the pressure of a tumour; a caseous abscess resulting from caries of the spinal column is a common cause of this form of myelitis. The whole thickness of the cord, for a variable vertical extent, usually suffers, this is called total transverse myelitis. Injuries of the cord may cut the cord through on one side—hemisection, producing hemiparaplegia—which means paralysis of one leg.

The pathogeny of myelitis is ill understood—some teach that it is secondary to vascular obstruction of thrombotic order. It may be that the irritation which causes inflammation is a blood poison which acts deleteriously on the vital tissues of the vessels and nervous elements.

Compression-myelitis may arise partly from vascular obstruction, partly from mechanical irritation; it is of the same order as the cerebritis surrounding tumours of the brain.

Symptoms.—A sudden onset with chilliness and febrile disturbance is the usual mode of commencement.

There is usually severe pain in the back, of a dull aching sort, which is perhaps partly due to implication of the meninges and posterior nerve roots.

It is increased more by hot and cold applications than by mere movement. A girdle sensation, described by the patient as a severe constriction, is usually present, and its situation denotes the upper limit of the inflamed cord. Paraplegia rapidly develops and there is very considerable loss and disturbance of sensation. The sphincters, too, are paralysed; the patient may be unable to control the reflex acts of micturition and defæcation, or the structures on which these acts depend may be destroyed, as in the case of myelitis of the lumbar enlargement. Reflex action is lost in those regions which correspond to the inflamed cord. Below this, the cerebral inhibition being removed, the reflex acts are exaggerated. This exaggeration may not be evident till a few days have elapsed. This is explained on the view that the inflammation constitutes itself an inhibitory influence on the nerve-centres situate below it.

The muscles supplied from the inflamed part of the cord waste rapidly and lose their faradic irritability and are always limp--just as in polio-

myelitis. Bed-sores, cystitis and secondary nephritis are very likely to arise. Some assert that myelitis can cause nephritis and also make the urine alkaline, by the action of the impaired nervous influence on the secreting functions of the kidney.

The disease in its severe and extensive forms is rapidly fatal.

Compression-myelitis from Pott's disease is sometimes amenable to treatment: absolute rest in the prone position. Actual cauterisation has been practised, but this must only be done in cases which have lapsed into a very chronic stage.

Any disease which destroys the continuity of the fibres of the cord will lead to secondary degeneration of the conducting paths. The posterior median columns degenerate upwards, the pyramidal tracts in the lateral columns degenerate downwards—after total transverse myelitis or after any injury which functionally or structurally divides the cord transversely.

TABES DORSALIS.

Posterior spinal sclerosis or locomotor ataxy has been justly called the "wide" sensory neurosis. It contrasts strongly with other spinal cord affections in all its special symptoms being on the sensory side of the nervous system.

Syphilis is regarded as a powerful cause, and in many of the cases undoubted evidence of it exists; but the sclerosis of the cord is not composed of syphilitic tissue, and cannot be removed by mercury and iodides; it is a degeneration from which there cannot be any recovery except by actual regeneration of tissue.

Middle-aged men are its most frequent victims; it is closely related to general paralysis of the

insane. Sexual and alcoholic excesses undoubtedly render the symptoms worse, and these causes are believed to be sufficient to produce the disease in predisposed subjects.

Symptoms.—It is truly a protean disease, the symptoms may be one, few or many, and the combinations of them are very numerous.

"Lightning pains" are really due to irritation of the nerve roots and are most severe, they may be attended with trophic changes in the skin, *e.g.*, herpes; patients often call them "rheumatic." The knee jerk is lost early in the disease.

Increased sexual desire and sometimes increased sexual activity—satyriasis, may be noted. But the increase soon subsides and loss of sexual power then ensues. Sometimes an imperfect erection of the penis with discharge of seminal fluid occurs without any obvious cause and with or without the mental accompaniments of the sexual act—spermatic crises.

Severe pain in the epigastrium with vomiting may occur in an equally unaccountable manner—gastric crises.

In the feet loss of tactile sensation, delay in the transmission of painful sensations, or actual analgesia may be noted. Sometimes hot cannot be distinguished from cold sensations. The areas in which these phenomena obtain are limited and vary from time to time. On waking in the morning the relation of the legs to one another may not be perceived until the patient looks at the legs.

The most important fact to remember is the loss of muscular sensation, the sensory nerves of muscles being damaged or destroyed.

Atrophy of the optic disk is not uncommon and may be the only symptom for even many years.

Vesical and intestinal crises are recognised, consisting in frequent desire to make water or pass motions, attended with severe pain. Apart from

these the commencement of the act of micturition is often difficult. Constipation is often obstinate. Shooting pains may occur along the penis and by the side of the rectum—a kind of "lightning pain" of these parts.

In tabes dorsalis three named symptoms have been described: Argyll Robertson pupil—in which the pupil contracts only when accommodation is made for near objects, the pupil not responding to light. Frequently also in this disease the pupil does *not* dilate to painful stimulation (pinching, faradic brush) of the skin of the neck.

Romberg's symptom is the inability of the patient to stand steadily with his eyes shut and his feet parallel and close together.

Westphal's symptom is loss of the knee jerk.

The inco-ordination of gait is first noticed by the patient when walking in the dark or with his eyes shut. There is at first no loss of muscular power and there need never be. But in the late stages of the disease the sclerosis spreads into the anterior horns and then the muscles waste as in progressive muscular atrophy.

The mode of walking is very characteristic; it is due to false impressions causing over-action and perverted action of the motor centres; the muscles on the front of the leg usually act excessively and cause the foot to be flexed too much at the ankle, so that the heel often first strikes the ground.

The duration of the disease is usually measured by years; the affection may become stationary at almost any period of its development.

In the end death may come gradually from the development of bed-sores and cystitis, or more suddenly from a laryngeal crisis due to progressive disease of the larynx; it is believed that the abductors of the larynx are gradually paralysed. Any intercurrent disease may cause death, and pneumonia appears to be often fatal.

The lesion in the cord on which the ataxy depends is the posterior root zone—the column of Burdach.

The whole of the symptoms of tabes dorsalis have been present in cases of peripheral neuritis and in cases of multiple sarcomata of the posterior nerve-roots of the cord.

The treatment is unsatisfactory: plenty of fresh air and a quiet mode of life, free from any form of excitement, are the best recommendations. Iodides should be tried for eight or ten weeks and then arsenic and strychnia. Alcoholic and sexual excitement should be abstained from.

SCLEROSIS OF THE SPINAL CORD.

If the physiology of the spinal cord be remembered, there will be no difficulty in mastering the symptoms which result from lesions of the different parts of the spinal cord.

In primary sclerosis of the cord the belief exists that the disease commences in the true nerve elements; there is a withering of the nerve fibres, and around this degeneration, the neuroglia and its vessels undergo the changes characteristic of of sclerosis.

The causes of sclerosis are often difficult to assign: cold and wet, syphilis, alcohol, lead, sexual excesses, gout, hereditary tendency, middle age, are the causes usually mentioned.

PRIMARY LATERAL SCLEROSIS.

This is a "system" disease of the crossed pyramidal tracts, probably degenerative in character, and very likely due to impairment of the motor nerve cells of the cerebral cortex. Middle-aged males

are its most frequent victims, but it may occur at any age and in either sex.

Weak stiff legs are the most characteristic symptoms; clonic and tonic spasms, increased knee jerks and ankle clonus are generally present. The weakness, stiffness and exaggerated reflex phenomena all increase together and usually slowly from the first.

The curious gait is due to the stiffness, the feet being scraped along the ground.

None of the symptoms proves the existence of *sclerosis;* all they prove is impairment of the functions of the pyramidal tracts.

This being the case it is easy to understand that chronic myelitis, compression of the cord and hysteria have to be diagnosed from lateral sclerosis. The first is usually attended with disordered sensation and the pelvic organs are often deranged; there may be signs of the anterior horns being diseased. If the inflammation is not very chronic the weakness precedes the stiffness.

In compression of the cord, myelitis usually develops; at first there may be but little rigidity, but when the myelitis and descending degeneration become marked, then extensor tonic spasm will be great. Other evidences of the cause of compression may be easily discovered. Disseminated sclerosis may begin first in the lateral columns, on one or both sides, when of course the symptoms will be those above mentioned.

AMYOTROPHIC LATERAL SCLEROSIS.

In this rare affection the motor nerve cells of the anterior horns of the cord and the motor nerve fibres of the pyramidal tracts undergo degeneration. It is most common in women from twenty-five to fifty years of age.

It may be confounded with hypertrophic cervical pachymeningitis, because in this affection there is amyotrophy and rigidity of muscle, and because in both affections the arms are the seat of the amyotrophy (muscular atrophy). There is weakness and wasting of some muscles; weakness, tenderness and stiffness of others.

Unlike the symptoms of pachymeningitis there is no anæsthesia and no "root" pains. The rectum and bladder are not affected; but constipation generally exists. The extensor muscles suffer most, so that flexion is noted at the various joints and the fingers are bent into the palm so strongly as sometimes to cause ulceration from the pressure of the nails.

But little can be done in the way of successful treatment. Iodides, bromides, arsenic and cod-liver oil may be prescribed. Try the nitrites.

PROGRESSIVE MUSCULAR ATROPHY.

The spinal motor nerve cells are the seat of a degenerative process; the faradic reactions of the muscles remain so long as any healthy muscular tissue remains; the amyotrophy (muscular wasting) is proportional to the degree of the degeneration, and the paralysis to the degree and extent of the atrophy.

A group of muscles, one muscle, or only part of a muscle may be wasted. The right arm is very frequently the first seat of the amyotrophy and most generally the small muscles of the ball of the thumb. The mode of spread of the atrophy is important: from the thenar to the hypothenar eminences, lubricals and interossei, and then up the arm, but sparing the triceps and the upper part of the trapezius. The "main-en-griffe,"

"griffin" or "bird-claw" shape of the hand develops. The corresponding muscles of the other side then become wasted and thus symmetry is noted. The face practically always escapes. An insidious onset and slow course naturally obtain, those being the clinical correlatives of the chronic degenerative process.

It should be observed that the skin and fatty tissues over the wasted muscles often waste too, and through the skin fibrillar twitchings of the muscles may be seen.

As a rule there is no disturbance of sensation and no loss of control over the sphincters of the rectum or bladder.

Death may result from the affection of the intercostal and diaphragmatic nervous centres, causing paralysis of respiration, or the motor centres of the medulla oblongata may become involved—progressive bulbar paralysis.

The "clawed" hand may be noted also in lesion of the ulnar nerve which supplies the interossei, paralysis of which is the chief cause of the "griffin" hand.

The muscular wasting may be most marked in the legs (leg type) and then the peronei are apt to be the most affected, talipes varus resulting (peroneal type).

This amyotrophy has chiefly to be separated from that due to peripheral neuritis and from the myopathic forms.

Progressive muscular atrophy is regarded by some as a degeneration, by others as chronic anterior polio-myelitis. It is most common in males between the ages of twenty and thirty-five. The causation is not properly known, but exposure to cold and wet, syphilis and over-exertion are mentioned.

PSEUDO-HYPERTROPHIC PARALYSIS.

This is probably a primary disease of the muscles —myopathy.

Enlargement of the calf muscles, buttocks, and of the infra-spinati; absence of knee jerk; waddling gait; inability to rise promptly from the recumbent posture, with lordosis, are the most prominent symptoms.

Large calves may be seen in infantile spasmodic paralysis, but then the knee jerks are present and exaggerated; in both affections, however, talipes equinus may be noted. The latissimus dorsi, lower part of pectoralis major and biceps are often much wasted.

Sometimes in progressive muscular atrophy the muscles become enlarged, but the distribution of the enlargement is seldom the same in the two diseases. Most cases of progressive muscular atrophy occur in grown-up men, most of pseudo-hypertrophy in young boys.

The mode of climbing from the recumbent posture is due to weakness of the flexors and extensors of the hip joints, and to the weakness of the erector spinæ; some cases of diphtheritic paralysis, some of progressive amyotrophy, and some of cerebellar tumour present this symptom, and if its mechanism be remembered, no wonder can be expressed that the symptom is not pathognomic.

Similarly the loss of the knee jerk is due to the atrophy of the extensor triceps; needless to say it does not matter what causes the atrophy. In diagnosis it is useful to remember that infantile palsy, tabes dorsalis, pseudo-hypertrophy and diphtheria are the most frequent causes of loss of the knee jerk.

The affection is hereditary, but transmitted

through the sisters or mothers like hæmophily and "hereditary chorea." The disease may commence during the first two years of life, but usually later than this or even as late as puberty. The interstitial tissues of the muscles undergo enlargement, and the microscope reveals fibroid and fatty tissues.

IDIOPATHIC MUSCULAR ATROPHY.

Besides Duchenne's disease just described there are cases of idiopathic muscular atrophy without any hypertrophy of muscles, which occur in families even for several generations—like hæmophily and hereditary chorea. The disease is not interchangeable with Duchenne's disease in the same families, and as a rule begins not in childhood but in early adult life. An infantile form is recognised in which the "myopathic face" is an important feature, the atrophy beginning in the lips. A juvenile form is also described which commences about puberty and the shoulder muscles suffer more than the hands. Whether these cases are myelopathies or myopathies is still doubtful, but the reaction of degeneration and fibrillary tremors have been observed in them, and these facts seem to imply that the nerves are degenerating; this degeneration of nerves obtains in Duchenne's disease also, in which it may be secondary to the muscular wasting.

ANTERIOR POLIO-MYELITIS — CORNUAL MYELITIS.

These terms imply an inflammation of the anterior gray horns of the spinal cord.

ACUTE ATROPHIC PARALYSIS.

INFANTILE paralysis is usually an atrophic spinal paralysis. A sudden lesion of the large motor nerve cells in the anterior horns causes rapid atrophy of muscle with loss of faradic reaction and of reflex actions. The palsy and loss of reflex action with limpness of the muscles are noted immediately, the wasting of muscle and loss of faradic reaction are observed at the end of a week. The limpness or flaccidity of muscle consists in an entire loss of muscular tone—tone is dependent on reflex action.

Although most common in the first two years of life, during the rachitic periods and the period of first dentition, acute anterior polio-myelitis may occur at any period of life. It may supervene suddenly in the midst of perfect health with no more ascertainable reason than a common catarrh. It may follow an acute specific fever. The onset is not always sudden nor always in the night-time. The first sign of illness may be increased heat of body, a few spasmodic twitches or severe convulsions, or the palsy may first attract attention. The paralysis may not reach its greatest extent or highest degree until two or three days have elapsed. Recovery is seldom or never complete.

Some muscles are more frequently involved and more severely affected than others, and these are apt to remain permanently paralysed and wasted: deltoid, anterior tibial, peronei.

Severe pain and tenderness of the limbs with fever are not unfrequent, and at the outset rheumatic fever may be diagnosed, but the knee jerk is lost. Some swelling of a joint with vaso-motor troubles and erythema and sweating have been noticed in the early stages, and have thus

increased the rheumatic resemblance. Besides pains there may be spontaneous sensory disorders with feelings of numbness and tingling. The sphincters almost always escape. The limbs become colder and paler than natural after the acute stage has passed by.

It is essential to note that sensory cutaneous disorders are absent in the vast majority of cases.

The reaction of degeneration may be noted after five days have elapsed from the onset,

No description is complete which does not take into account the tendency of the disease to regress —so that muscles once paralysed again become useful.

Regressive paralysis is another name of this affection. But the amount and degree of recovery is very variable and as a rule some muscles remain weak and wasted; and overaction of their antagonists causes deformities to arise—talipes equinus, equino-varus, cavus and calcaneus may result, and when the shoulder-muscles are wasted the humerus may be dislocated. The limbs do not grow at their proper rate and the bones may become very thin—the scapula often fails to grow when the shoulder is affected. This failure in growth of the skeleton is partly due to the absence of the stimulus to nutrition afforded by muscular action with its accompaniment of increased blood supply.

Although acute atrophic palsy is generally due to a cornual myelitis, still thrombosis, hæmorrhage or embolism of the cornual regions are competent to produce similar clinical appearances; or these vascular processes may cause the myelitis. The process is often not strictly limited to the gray horns, but seems to splash so as to involve the lateral column, this is noted in microscopic sections and sometimes in rigidity of muscles during life, *e.g.*, in one case of acute atrophic palsy

of the shoulder-muscles the leg on the same side of the body presented ankle clonus, increased knee jerk and fibrillar contractions of the calf muscles probably due to implication of the lateral white column.

The pains and other sensations noted at the onset should be ascribed to a shock or temporary involvement of the posterior horns and nerve roots.

In peripheral neuritis pains and anæsthesia are usually present throughout, this fact is of service in differential diagnosis; but read the remarks on p. 304.

Exposure to severe heat or cold and wet may be causes of this kind of atrophic palsy.

Treatment.—This is fully discussed in the Author's *Treatment of Disease in Children.* For the first ten days absolute rest in bed is the most important indication, and the prone posture is preferable to the supine. If there is fever, cold applications to the head and spine may be used; some advise icebags. A leech or two may be placed over the supposed seat of inflammation in the cord. After two weeks have transpired the muscles should be galvanised and shampooed. A systematic massage for twenty minutes twice a day is invaluable in restoring power and preventing wasting of muscle. By careful massage and the employment of opposing movements, great benefit may accrue. The permanently wasted nerve cells and muscles cannot be restored, but hypertrophy of the nerve cells and muscles which remain may make them efficient substitutes for the lost ones. Whether there are supernumerary nerve cells which can undertake the functions of the destroyed must be a moot question.

In recovering from paralysis it will be observed that a muscle may be contracted by the patient's volitional effort before this muscle yields a con-

traction to the faradic current—showing how much more subtle than the faradic stimulus is the normal nervous impulse.

BULBAR PARALYSIS — LABIO-GLOSSO-LARYNGO-PHARYNGEAL PALSY.

This affection is progressive muscular atrophy due to degeneration of the motor centres in the medulla oblongata; it is altogether like the homologous disease of the motor centres lower down, and it may be the last stage of ordinary progressive amyotrophy. Though the lips waste yet it is doubtful whether the facial nerve nucleus undergoes degenerative atrophy. Gowers has advanced reasons for thinking that the hypoglossal nucleus innervates the muscles of the lips (*see* p. 317). The pigmentary degeneration with its accompanying sclerosis is probably limited therefore to the hypoglossal and spinal accessory nerve nuclei. The latter is the motor nerve of the pharynx, larynx and heart, though it is distributed with the vagus.

Of insidious onset, the disease announces itself by an impairment of articulation of the lingual consonants—which may suggest general paralysis of the insane. The paralysis of the tongue and lips proceed *pari passu* with the wasting of these parts. The involvement of the palate and pharynx is announced by the development of a nasal voice and difficulty of deglutition.

Salivation is a remarkable symptom and the handkerchief is much in requisition to sop up the saliva flowing from the open mouth. Fluids may regurgitate through the nose or fall the wrong way into the larynx; whilst solid food is apt to accumulate in the buccal pouches, because the

tongue is so feeble. In the final stages the tongue may lie helpless as a flabby wrinkled mass in the floor of the mouth. Fibrillary tremors may be noted in the lips and tongue. The faradic reactions are present so long as any healthy muscle and nerve fibres remain; when the degenerated nerves and muscles are in the ascendant, the reaction of degeneration may be noted. The extent and degree of the laryngeal palsy vary from the slightest to the most severe degree (*see* Laryngeal palsy).

The malady always ends fatally after lasting many months.

Asphyxia, syncope, starvation or intercurrent pneumonia may be the cause of death.

The disease has to be diagnosed from tumours affecting the bulb and from diphtheritic palsy.

Nervine tonics, especially arsenic and strychnia, are the best drugs to prescribe. If syphilis be suspected iodides may be ordered, but even if syphilis has been operative the degeneration resulting is not amenable to antisyphilitic remedies. In one case it was thought that syphilitic arteritis was the cause of the degeneration and this disease may be removable by iodides.

PARALYSIS AGITANS.

PARKINSON'S DISEASE presents some important symptoms: tremors, muscular weakness, rigidity and slowness of movements—most noticeable in the speech and gait, a vacant expression and a curious tendency for the head, trunk and shoulders to curve forwards, with a displacement forwards of the centre of gravity of the body.

"Festination" consists in a running forwards with short sliding steps; "retropulsion" in a simi-

lar mode of progression backwards; "propulsion" alludes to the forward inclination of the body; these may be spontaneous, but are usually induced by slight pushing of the patient or by a slight desire on the patient's part to move in the manner indicated. Rigidity of the muscles comes on after the tremors as a general rule; the slowness of speech and movements remind one of myxœdema, but the other symptoms of this are absent, and when tremors occur in myxœdema they are not of the same regular kind as those of paralysis agitans, which consist of the regular repetition of the same movement, the amplitude of the vibrations is usually very limited and in this is unlike the extensive waves of disseminated sclerosis. The tremor of paralysis agitans usually ceases during volitional movement; it begins generally in the right hand; the rate of its progress to other parts is very variable.

The disease occurs after forty as a general rule, that is before senile changes set in; more males than females are affected; sudden emotion has apparently immediately excited the disease, the tremor of alarm passing into that of the disease. Nystagmus seldom occurs.

The pathological anatomy is unknown and the pathology is doubtful, but probably the lesion is in the motor centres of the brain.

The diagnosis has to be made from "senile tremor," which occurs in old age and in which the head is most affected and the tremor often begins in the head.

Post-hemiplegic tremor may resemble the tremor of paralysis agitans. The duration of the disease is usually measured by years.

Prevention of physical and mental strain; nervine sedatives and tonics, with a healthy mode of existence—are the best suggestions in treatment.

MYXŒDEMA, CACHEXIA STRUMIPRIVA, CRETINISM.

These diseases are grouped together because recent research goes to prove that they all depend on a loss of the functions of the thyroid body.

In cretinism the disease commences before birth, therefore growth and development are impeded.

In cachexia strumipriva the symptoms result from extirpation of the thyroid body (for goître) and are correspondingly acute and severe.

In myxœdema the thyroid is slowly destroyed by a process which causes atrophy of its vesicles and gland tissue, with overgrowth of the fibrous interstitial tissues (sclerosis).

In **cretinism** the body is stunted and the mind is not developed.

It occurs in sporadic form in England, but its home is in the valleys of Switzerland and Savoy. The skin is pachydermatous and opaque, the tongue large and thick, the expression stolid and stiff; the lips are thick and salivation is common; the abdomen is protuberant. The basi-sphenoid and basi-occipital bones ossify too early, and this partly alters the shape of the head—the vault of which is overgrown. Cretins are impotent, the testes are often undeveloped and hair may be absent from the pubes. In sporadic cretinism the thyroid gland is absent and there is usually a large spongy mass of fat in the posterior triangle of the neck, on one side or both, and sometimes in other parts of the body.

In fœtal cretinism a longitudinal section of the bone shows that a fibrous lamina continuous with the periosteum intervenes between the shaft and its epiphysis; the heart may be malformed.

In **myxœdema** the patient's general appearance

suggests chronic Bright's disease due to a large white kidney, and this also because middle-aged women are frequent subjects of both diseases.

But there is no albuminuria and the cheeks are often red in myxœdema. The œdematous state of the skin and subcutaneous tissues differs, in not pitting, from that of Bright's disease. The hands are often "spade like" from the thickening due to the œdema. The movements, especially of articulation, are very slow and the patient takes a much too long time to say what she wishes, or to do any piece of work.

The body is usually cooler than normal and the best treatment consists in keeping the patients warm; this is the reason why Turkish baths are so useful. Horsley's monkeys with extirpated thyroids lived much longer if kept at a high temperature (90° F.), but they perished rapidly when left in the cold.

Tremors and weakness, in addition to slowness of movements, are noted especially in experimental myxœdema and cachexia strumipriva.

Drachm doses of infusion of jaborandi are useful.

TUMOURS OF THE CORD.

Tumours may develop outside or inside the dura mater, or within the substance of the cord. Fatty tumour and hydatids rarely occur in the extra-dural space, and malignant growths may arise from the vertebræ and cause compression of the cord. Gummata, sarcomata and myxomata, tubercles, echinococci and cysticerci may originate within the dura mater; neuromata may develop on the roots of the nerves. Gummata and gliomata occur within the cord and rarely sarcoma, tubercle and myxoma; usually these growths commence in the pia mater or in the lining of

the central canal. Sarcomata and neuromata are often multiple on the nerve roots; the sarcomata may be exceedingly numerous. The symptoms are due to pressure and its effects on the cord. Local and radiating pains are marked symptoms. The muscles often become rigid and make the spine very stiff, this is very noticeable in the mobile regions of the spinal column—neck and loins. Tumours of the cauda equina often simulate those pressing on the lumbar enlargement, but usually the symptoms are bilateral from the first, and the anæsthesia has a different distribution, the coccyx and anus often being completely anæsthetic—which is not the case in tumours growing from the lumbar enlargement. Nerves nearest the middle line are involved, and the skin of the buttocks, legs and feet—except the inner part of the two latter—may be anæsthetic. Whereas in tumours pressing on the cord, the anæsthesia is more often distributed to the inner side of the leg, and outer, front and inner side of the thigh, and to the groin and scrotum. The mode of origin and arrangement of the nerves explain these facts.

The paralysis of one leg after the other is rather characteristic of pressure by a tumour. The situation of the tumour may be discovered by testing the reflexes carefully. One tumour grew from the lumbar enlargement and abolished the knee jerk on the left side, the quadriceps extensor on that side was also atrophied; there was weakness and stiffness of both legs with ankle clonus on both sides. In this instance the tumour damaged the second, third and fourth lumbar nerves and pressed on the cord; the knee jerk on the other side was increased.

The diagnosis must be first of the situation, and secondly, of the nature of the tumour. Needless to say a positive diagnosis may be very difficult (*see* remarks on p. 304).

SECTION XIV.

FUNCTIONAL DISEASES OF THE NERVOUS SYSTEM.

EPILEPSY.

EPILEPSY may be defined as a functional disease causing a loss or impairment of consciousness, repeated at certain intervals, and often attended with spasms of voluntary (and involuntary) muscular tissue.

In the variety termed *haut mal* or *grand mal*, not only is there total loss of consciousness for some time, but there are two distinct phases of spasm or convulsions, the first being nearly always tonic and affecting the voluntary (and involuntary) muscles, and the second being clonic in character.

In rigors and in tetany there is no loss or derangement of consciousness, the former consists chiefly of clonic spasm, the latter of pure tonic spasm. In *petit mal* simply perversion or more often loss of consciousness obtains, with or without very slight spasm, mostly of clonic order, and then generally in the face, tongue or hands.

Physiologically considered, convulsions may originate in abnormal explosive discharges of nervous energy from the motor area of the gray cortex, from the gray matter of the pons and medulla and spinal cord. Philosophically considered, we ought to have a term to signify sudden explosive action in any nerve centre, whether the nerve centre subserve mentation, sensation or motion. Probably in most epilepsies of cortical origin all these three kinds of function are concerned.

Generally, epilepsy is due to an inherent instability of the nerve cells in which the discharge originates and epilepsy is an example of a pure neurosis.

We do not now consider that the vaso-motor centre is the first part of the brain to be affected but that it shares with the other centres in the explosion originating elsewhere.

Epilepsy is most common in the youthful period of life, but any age and either sex may be liable. Worry, anxiety, overwork, intemperance, sexual excesses, masturbation are given as causes, but in many cases these causes are simply and solely the expressions or manifestations of a feeble nervous system; and it is quite as possible that intemperance is due to the epileptic nervous constitution, as it is that intemperance increases the neuropathic disposition. Blows and other injuries to the head may be causes of traumatic epilepsy, and they may be consequences of epilepsy.

Petit mal is characterised by a sudden loss of consciousness of only a second or a few seconds duration. The face may be noted to become suddenly pale and the eyes fixed, with dilated pupils. Standing or walking or long accustomed, well organised, acts continue, but acts requiring full consciousness are in abeyance. Eating one's dinner may be possible, but the taking in of a new fact or the origination of a sentence, would not be possible. The well organised, least specialised, most ancient, *i.e.*, automatic acts, may be performed in the state of unconsciousness. A feeling of strangeness may or may not be recognised by the patient himself. Some attacks of *petit mal* merely consist in curious sensations, often occurring in the head, with mere perversion of temper or intellect, and these are such as, if preceding *haut mal*, would be termed auræ or warnings.

The epileptic aura is of course due to the nerve

discharge; and very valuable evidence of the situation in which the nerve discharge begins may be obtained by carefully noting the place of onset and the line of march of the epileptic aura. The aura very frequently begins at the most distal part of a limb and rapidly spreads up it until it reaches the head when memory and consciousness suddenly cease. The aura may begin anywhere in the body or may consist of a change in the mental state of the patient. The *epigastric* aura is common and is variously described as a queer feeling or feeling of sickness, at the pit of the stomach; the sensation rapidly passes upwards, diffusing in area as it ascends and a choking sensation may be felt before consciousness ceases; the aura is evidently in relation with the vagus centres and paths.

Haut mal—epilepsia gravior.—Loss of consciousness and general tonic spasm suddenly supervene with or without warning; the spasm of the muscles of expiration and of phonation cause the piercing shriek or epileptic cry, and the tonic spasm causes the body to be thrown violently down. At times sudden resolution of the limbs causes the patient to flop down, there being no spasm at first and even none after; it seems then as though all the nerve cells on which the standing posture is dependent were suddenly deprived of their energy. The tonic spasm causes clenching of the hands, distortion of the face and curious attitudes of the limbs. The joints may be flexed or extended. The eyeballs are usually conjugately deviated to one side or upwards. The plain muscular tissue is also in a state of tonic spasm, as may be noted in the contracted pupil, the small pulse, the pallor of the face from arterial spasm; respiration ceases and causes some cyanosis. After lasting some seconds this tonic stage gives way to the clonic one or second stage, in which jerky respirations and clonic spasms are noteworthy fea-

tures; in the clonic spasms the tongue may be thrust out and bitten by the clonic spasms of the masseters, the eyes work about, the skin breaks out into a sweat as the vessels again dilate and the heart beats vigorously. Urine and fæces may be passed either during the tonic or during the clonic stage. Gradually the spasms cease after lasting a half to several minutes, and then the consciousness slowly returns. But the patient remains drowsy and bewildered, though he may open his eyes and attempt to rise. He may complain of headache, which may keep him awake, or he may pass into a sound sleep from which it is difficult to awaken him. Sometimes consciousness is rapidly recovered and a feeling of excessive *bien être* may be experienced, with a capacity for considerable mental work. Very often the patient passes a large quantity of pale bright water.

After having had opportunities of witnessing many epileptic fits, the author has great confidence in asserting that no morbid process can be more varying in character than these fits are; this applies to the relative duration of the stages, to the character of the tonic and clonic spasm, to the rate of recovery of consciousness. A severe fit speaking roughly and for the purposes of diagnosis, may be described as one in which the patient falls down, becomes blue, wets or dirties himself and bites his tongue.

Many epileptics have had convulsions whilst cutting their first teeth. The mind may be apparently untouched, or memory and intelligence may be variously impaired in different degrees. *Petit mal*, being epilepsy in the mental centres and being frequently repeated, is that variety which causes most mental deterioration.

Abortive epilepsy is defined as epileptic attacks in which consciousness is not completely lost. The precise nature of consciousness is not known

but the theory of its dependence on the healthy action of perceptive centres situate in the cerebral cortex, may explain many of the phenomena of mental epilepsy; this theory implies degrees of consciousness and that different individuals have different degrees of consciousness. Epilepsy of some mental centres destroys their activity leaving the activity of other centres free or but little impeded. In entire loss of consciousness it is not necessary to suppose that there are nerve storms all over the cerebral cortex because a storm in one part may exercise a restraining influence on the activities of other parts—so-called inhibition.

Attacks of abortive epilepsy assume various forms, but in the same individual the eccentric action is usually the same—undressing in public, suddenly leaving a public meeting and retiring to make water, or making water before an audience, or suddenly running along without obvious reason.

Reflex epilepsy is that form in which the loss of consciousness and convulsions are evoked by a definite exciting cause; the zone, irritation of which causes epilepsy, is called epileptogenous (*see* Hysteria). The epilepsy of guinea pigs is of this description. The cause of the recurrence of epileptic attacks is doubtless the instability of the molecular equilibrium in the nerve cells, but the exact reason for the fit occurring at any particular time is mysterious; it is possible that in many cases a reflex irritation causes the explosion, *i.e.*, there may be an epileptogenous zone at the periphery of the nervous system in many cases of epilepsy; the situation in which an aura is felt may be this epileptogenous zone in any particular case; a powerful impression at this site may arrest a commencing fit. Irritating articles of food, worms in the intestines, calculi in the kidney or bladder, a bad smell, a strong flash of light, a loud noise, are some varieties of irritation of the periphery of

the nervous system, which are capable of evoking an attack. A similar causation may be noted in megrim, hysteria, paroxysmal insanity, chorea, tetany, laryngismus stridulus.

The diagnosis of pure epilepsy is most difficult until several attacks have occurred, and even then it may be impossible to say whether any organic disease is or is not present.

If it is borne in mind that any impairment of the health of the epileptogenous nervous centres may cause a fit, the difficulty of understanding why a diagnosis should be difficult will cease; the impairment may be a toxæmia as in uræmia, acute specific fevers and the like, or it may be the result of impaired circulation (syncope) or of the indirect influence of organic disease of the brain or its membranes.

The *status epilepticus* consists of repeated attacks of epilepsy, the patient not properly recovering from each convulsion, in this condition the temperature rises and has reached 106°; a single convulsion may be attended with a slight rise of temperature. In hystero-epileptic attacks, even frequently repeated, a great rise of temperature is not noted.

Epilepsy feigned by malingerers may be detected by the irritation of a faradic brush and by the absence of pallor of the face and dilatation of the pupil. The author believes, however, that malingering implies the possession of the neuropathic disposition; malingerers sometimes have had genuine fits.

Epilepsy and hysteria may co-exist in the same patient. In hysterical attacks the patient may make a great noise, singing, laughing or crying, or she may simply sulk or act in some other way; but there is no biting of the tongue, nor relaxation of the sphincters, nor actual loss of consciousness.

HYSTERO-EPILEPSY.

No disease is more protean than hysteria; the kind of symptoms varies from time to time; the combinations of symptoms present at any one time may be very numerous; the perversions of mental states and varieties of emotions are as numerous as it is conceivable for them to be. The only method of grasping the range and variety of symptoms is to recall the list of functions of the human mind and then to admit that any number of them may be increased, diminished, lost or perverted; there is no sensory function which may not present a hysterical perversion, no motor quality which may not be disordered in hysteria.

The convulsive phenomena may reach an alarming degree of severity; to these attacks the terms —hysteria major, hysteroid, hystero-epilepsy—are assigned.

In the worst form the following stages may be noted—a prodromal stage—which consists of a hysterical clavus, globus, ovarian hyperæsthesia, mental disturbance or a hallucination may be present. The second stage consists of a loss of consciousness with general tonic spasm suspending respiration; and followed by clonic spasm with irregular stertorous breathing. This is called the epileptic stage for obvious reasons. After a brief period in which the consciousness remains suspended, the third stage of *grands mouvements* supervenes; there may be opisthotonos and violent movements of various kinds; this is succeeded by a fourth stage in which the patient shouts for joy, cries with anger, becomes erotic or presents other emotional or mental disturbance.

Such severe fits are seldom seen in this country, consciousness is usually not so completely lost and

the co-ordinate movements consist mostly in kicking, plunging and striking with the arms and head.

Hysterical chorea consists of general spasmodic movements so closely resembling those of ordinary chorea as sometimes to be indistinguishable from them except by the history and associations.

Treatment.—Nothing is more important than attending to the hygiene of the body; feeding, clothing, ventilation, bathing, exercise, sleep, digestion, and the state of the bowels should be carefully investigated. Nervine sedatives and tonics are the principal drugs. Bromide of potassium may be given in large doses three times a day, and its administration should be continued in well marked cases for at least six months after all fits have ceased. The drug is believed to have the property of restoring the nerve cells to a condition of stability. Albertoni proved experimentally that bromides lowered the faradic irritability of the motor cortex of animals. Liquor arsenicalis or belladonna may be combined with the bromide to prevent the occurrence of the bromide rash and to lessen the depressing effects of the drug. A mixture of rhubarb and soda is often valuable when an epigastric aura is present.

HYSTERIA.

A PURE neurosis due to defective energisation of the nerve cells of some part of the central nervous system, most probably the cerebral cortex.

Neurasthenia consists also of a pure neurosis due to debility (defective innervation or energisation) of the nerve cells of any part of the nervous system, it is the soil out of which grow the various

neuroses. Neuroses have a great tendency to be paroxysmal, even hypochondriasis is not absolutely continuous.

Worry and mental strain are potent causes of debility of the nervous centres, they drain the centres of their nervous energy; their physiological equivalent is a dissipation of the vis nervosa. But nervous debility may arise as the effect of more material causes—fevers and other exhausting diseases. In cases in which the debility is situated in the cerebral cortex the alliance with insanity is too obvious to need special reference.

In hysteria the highest functions of mind are in abeyance or perverted, and the patient is unreasonable and more or less devoid of that power which goes by the name of "the Will."

Some hysterical symptoms:—

Globus is a peculiar choking or constricting sensation or a feeling as of a foreign body or ball in the throat.

Clavus is a severe pain at one spot, often the temple, as if a nail were being driven into the head. Infra-mammary pain below the left breast is common.

Spasmodic ptosis:—the eyelid is kept down by slight spasm of the orbicularis palpebrarum, the levator palpebræ acts perfectly.

Ovarian hyperæsthesia:—pressure over the ovary causes pain and may induce a fit or stop one.

Hyperæsthesia of the spine, joints and other parts of the body is common. Analgesia of the skin, muscles, bones and ligaments may obtain, the patient submitting, without murmuring, to be pricked deeply with a needle, struck severely on the shins, or to be faradised with the strongest faradic current. The anæsthesia often is one-sided, ceasing abruptly about the middle line of the body. Loss of the faculty of feeling pain—analgesia—

may exist alone or there may be hemi-anæsthesia, touch not being localised or felt at all. Therm-anæsthesia or inability to distinguish hot from cold may be observed.

Crossed amblyopia consists in blindness of one eye, the other presenting but little difference from health.

Hemianopsia may be present. In amblyopia there is usually peripheral restriction, loss of colour vision and diminution of the acuity of vision.

The mental derangements are numerous, emotional manifestations arise without a proper exciting cause, she may be very loving, even erotic without any advances from the other sex; she may manifest hatred without cause; she is fond of attracting attention, of commanding whilst herself bedridden, of getting sympathy; her whims, cravings and caprices are truly extraordinary. The fact is that any emotion may be put in action not by the proper exciting cause, but simply because of the inherent instability of the nervous machinery on which that emotion is dependent. The author may be pardoned for regarding as evidence of a neurosis, the longings of pregnancy.

The line between healthy and hysterical mental action is differently situated according to the temperament of the individual and in estimating the cerebral manifestations the *personal equation* must be taken into account, an Englishman behaving differently from a Frenchman under similar extrinsic circumstances.

Any motor function may present any modification of which its machinery is capable. The hysterical fit consists in sobbing, laughing, screaming and crying, often accompanied by clavus or globus and attended with violent movements; the patient being a mere machine, the disease may metaphorically be regarded as a poor performer, having the power of playing on the nervous instru-

ments just as any bungler may get sounds out of a musical instrument.

The fit may last a few minutes or many hours, but it has not a definite tonic stage, there is no loss of consciousness with insensitive conjunctiva and dilated pupil; the fit never occurs during sleep; is not followed by profound sleep, though there may be a sense of fatigue; the clear polyuria may be noted (*see* Epilepsy).

Contracture or persistent tonic spasm may be noted after the fit; rhythmical flexion and extension of the arm may commence the fit, or be present as an isolated symptom.

Hysterical aphonia from paralysis of the adductors is a familiar symptom, also hysterical paraplegia—*see* Lateral Sclerosis. The occurrence of relaxation of the sphincters, bed sores or cystitis is generally regarded as evidence of something more than hysteria.

Hysterical vomiting, phantom tumours due to tympanites and contraction of the rectus muscle, diarrhœa, polyuria, palpitation, panting, very rapid respiration, curious feelings—are some other symptoms. In hysteria there is no nervous function which may not present morbid signs, and some go further than this when they assert that all functions are either nervous or under the control of the nervous system. From this it would follow that we might have hysterical suppression of urine (anuria), hysterical pyrexia, hysterical acholia, indigestion. This use of the term is perhaps too wide, but no harm to medical science will result if it leads to the belief that, in the absence of organic disease, the various functions may of themselves undergo very wide variations. A proper understanding of rhythmical nervous action will help to strengthen this belief.

Hysteria begins most commonly at puberty; it is most frequent in females, but either sex and any

age, except perhaps males beyond middle life, are liable.

Treatment.—Removal of the patient from surroundings in which her disease has been fostered—isolation with or without massage—is most important. The behaviour of doctor and friends should be such as is calculated to restore confidence to the patient; she should be encouraged to do something. The fits may be arrested by moral persuasion, by the faradic current, or by a cold douche. General hygiene and nervine remedies. Tea, coffee and stimulants should not be allowed especially if there is any impairment of digestion.

Hysterical anorexia or anorexia nervosa consists in a persistent refusal of food, which leads to great emaciation, and melancholia is the prevailing mood of mind.

Hysterical tremor may be fine or coarse, the latter affects the hands or head, and is rhythmical, occurring in the absence of voluntary movements; the fine tremor accompanies movement and is very irregular; it presents a jerky increase in range or rate which is rather characteristic. The differential diagnosis is from paralysis agitans, simple, senile, asthenic and toxic tremors.

Simple tremor may result in anyone who uses his muscles for unaccustomed work, as when a writer digs and immediately after tries to use his pen.

Asthenic tremor is of the same order, but the deterioration of the nervous machinery results from general debility induced by fevers and other exhausting diseases. Toxic tremors are such as as occur from uræmia and mercurial poisoning.

In hysteria the phenomena of *transfer* may be observed; the hysterical paralysis or anæsthesia may pass from one side of the body to the other either spontaneously or as the result of the appli-

cation of electricity, strips of plaster, metals, discs of wood or at the suggestion of the operator.

Hysterical paraplegia is very common; its symptoms are precisely those of lateral sclerosis; there is impaired power of the upper or cerebral motor, *i.e.*, motor cortex and pyramidal tracts; the patient "cannot will" to move the legs, either because she does not try to do so, or if an effort is made it is insufficient to innervate the cerebral motor centres and paths.

This form of paraplegia often follows a mental shock or emotion; it may come at once or be slowly developed.

The sphincters are not affected, and trophic lesions do not occur, *i.e.*, no bed sores, cystitis or muscular wasting develop, though redness and œdema, of variable kind, may appear in the paralysed legs; a *tache cérébrale* may be white or red and very marked.

The muscles react to faradism, but there may be anæsthesia to the faradic current and to other painful impressions.

Pure lateral sclerosis is necessarily insidious in onset, and therefore it is only when hysterical palsy is slowly developed that a mistake can arise. That hysterical paraplegia may pass into lateral sclerosis seems certain.

That hysterical signs may co-exist with those of organic diseases should never be forgotten.

CHOREA.

The chief symptom of Saint Vitus' Dance, a series composed of various involuntary movements occurring at different intervals, is always associated with more or less weakness of the voluntary movements, and with some impairment of their

co-ordination, so that the grasp of the affected hand is always weaker than natural, and some, often slight, difficulty of performing fine movements, such as picking up a pin, exists. In some cases the weakness or paralysis is much more obvious than are the involuntary jerkings, and very rarely the inco-ordination of voluntary movement is the worst feature, jerks and weakness being less marked than inco-ordination. Hughlings-Jackson teaches that the inco-ordination is only another expression of the volitional paralysis. At all events, that some weakness of volitional movement always co-exists with the choreic movements, is a proposition which cannot be denied.

Though the symptoms are chiefly motor, sensory and mental derangement may occur—anæsthesia, hyperæsthesia, altered temper and other (hysterical) manifestations.

The articulation and protrusion of the tongue are deranged, and the articulation is most affected when the chorea is worse on the right side, probably because the chief centre of speech is on the left side of the brain in right-handed individuals.

The movements of chorea are something like those of new born infants and animals—microkinesis.

Similar movements may be seen in tubercular meningitis and hydrocephalus, which will not be considered astonishing, if a right view of choreic pathology has been obtained.

Although most common in females about the second seven years of life—period of second dentition—chorea may occur in either sex, and almost at any age, even as young as three years, or as late as seventy. In early life it often has a great association with rheumatism and heart disease, though it may be independent of either affection.

Fright is a potent cause, also excessive study, and other causes of mental strain.

Most cases are dependent on defective nutrition of the motor centres of the brain; choreic movements may be regarded as due to scattered discharges of the nervous energy of the motor cortex, less violent and more continuous than occur in convulsions and epilepsy; the paralysis is due to exhaustion and defective nutrition, just as occurs after epilepsy. The defective state of the motor centres may result from an acquired instability—a pure neurosis—induced by fright or overstrain, or it may be brought about by more material causes, such as the rheumatic poison, or other toxæmia, by capillary embolisms or thrombosis, by areas of hyperæmia and anæmia.

Very often there is a neurosis in the family. White races are more prone to it than black.

Chorea is often first noticed by the child frequently dropping articles carried in its hand; the explanation of this is doubtful; probably the motor nerve centres concerned suddenly get deprived of their function, perhaps by inhibition; the fact being that the article may not be jerked out of the hand.

The march of the jerking movements from one part of the body to another often corresponds to the arrangement of the motor cortical centres; from arm to leg and then to trunk. In hemichorea those muscles which usually work together on opposite sides of the body, are usually the seat of spasms, so that pure hemichorea is not observed, or very rarely; this may be explained on Broadbent's hypothesis of the intimate association of those nerve nuclei of the spinal cord, which subserve bilateral movements; or it may be explained on the theory that some movements are represented mostly in one hemisphere, other movements in both equally, but if this were the case pure hemichorea should not be an impossibility; neither is it, if we designate as chorea, some spasms limited

to the hand and mouth and leg, of which the author has seen a few cases.

In severe chorea the whole of the muscles are thrown into violent action; bruising may be very extensive, and a padded bed is required.

The movements are increased by the presence of strangers, by mental agitation, but cease usually during sleep. Deglutition may be impossible, and the patient may have to be fed by the rectum or by means of a nasal tube. Most cases are not of the severest description.

Fever as a rule is absent; emaciation is seldom extreme. The urine often contains an excess of urea and phosphates; systolic murmurs in the mitral area are common, and variously explained as the effect of endocarditis, of dilatation of the heart, or of irregular action of the musculi papillares.

If death occurs, a row of fine beads, as of recent endocarditis, is generally found.

The duration of the disease varies very much, but two months is an average. The prognosis is as a rule favourable, but recurrence is not uncommon.

Treatment.—Removal of any peripheral irritation, such as worms, indigestion, and menstrual disorders. Absolute rest is most necessary in bad cases.

In pregnant women and in young females about puberty, the disease is apt to be of a severe type, and has often ended fatally.

Fresh air, cold douching, bathing, exercise, and massage, are valuable agencies in the treatment of chorea. The requirements of rheumatism must receive attention, but salicylates do not appear to control chorea complicating, succeeding, or preceding rheumatism.

Arsenic in small doses is most useful in neurotic, as distinguished from rheumatic chorea. When

given in increasing doses, pigmentation of the skin and mucous membranes, with roughening and shedding of the epithelium, may occur.

Full doses of chloral is a useful method in some severe cases.

Laryngeal chorea consists in paroxysms of harsh coughing, ceasing during sleep; phonation is often difficult; it may occur alone or in association with general chorea; the laryngoscope as a rule reveals no laryngeal change; electricity is curative.

HYPOCHONDRIASIS.

Hypochondriasis is most probably a derangement of the cerebral cortex, rendering it more prone to feel sensations which in health are generally unfelt. However much the mental condition and spirits of any individual are under the control of impressions reaching the brain from every part of the body, and especially from the abdominal and pelvic viscera, these impressions do not enter perceptibly into conscious life, they are unfelt. But in hypochondriasis and other allied states, owing to an increased sensitivity of the mind or cerebral cortex, these impressions make up part of the conscious life of the individual, and cause the patient infinite distress. Happiness is an affair of "the stomach" only so long as the working of this organ influences the brain in an unconscious way, its unfelt impressions produce the normal massive voluminous sensation of *bien être* or cheeriness. However, it is probably an erroneous view which always ascribes low spirits to derangement of the liver and stomach, for in many instances the brain is the first seat of mischief, and there should be nothing difficult to understand in this. That morbid cerebral action may manifest itself by queer

feelings about the stomach, and by low spirits we know from the study of epilepsy of central origin. Probably a mutual tension between brain and stomach exists, the centre altering the periphery, and the periphery influencing the centre, in harmony with well understood physiological principles.

MIGRAINE.

Megrim, hemicrania or sick headache should be regarded as epilepsy of the sensory centres of the brain; it is a paroxysmal, often periodic, affection having a close resemblance to epilepsy both in its clinical characteristics, and in its alliances, being often directly hereditary.

Sometimes the mother has been insane or has had chorea or epilepsy instead of megrim. The exciting causes of megrim are potent and numerous—fatigue of any sense organ, especially of the eyesight, mental strain, impure atmosphere and close study. The sensory nervous centres are the seat of nervous discharges, or as Liveing calls them "nerve-storms," but whether these occur in the cerebral cortex or between the optic thalami, and the medulla oblongata is uncertain; the occurrence of coloured vision and the great mental alteration suggest the former. The pathology should be considered with that of epilepsy; both diseases have been described as of vaso-motor origin. The mode of commencement of the attack varies in different cases: a disturbance of the same named half-fields of vision may be noted by the patient first (hemianopsia); or a part of the visual field may appear blind or coloured, and the colouring may be of various kinds or there may be a sense of flickering or other kind of movement in a part of the field of vision; a scintillating scotoma

is a beautiful glittering area in the field of vision, recalling the negative images produced by looking at the sun. When the altered or blind area has a zigzag outline suggesting the wall of a fortified town, the term teichopsia is used. Sometimes a numbness or tingling in one hand, one side of the tongue or one-half of the face succeeds the first symptom. The secretions on one side of the body may be diminished or excessive. Commonly headache is the first symptom, and the pain often fixes on one spot in the temple, over the eye or in the eyeball; the pain increases in severity, and may be attended with a throbbing sensation, when this is the case the temporal artery swells wonderfully, and œdema of its contiguous tissues may be noted; the scalp is often tender over the same area; the eye may be injected and may water freely. A sense of misery and chilliness may accompany the headache which is increased by any movement. After a variable while the patient feels sick, and this may go on to actual retching and vomiting; the attack may terminate in sleep, like epilepsy and ague, and then on re-awakening the patient's feeling of *bien être* may be rather excessive.

Some have asserted that excess of uric acid in the blood is the cause of some cases of megrim. (See papers by Haig in the *Practitioner*). Gout and asthma do certainly exist in the same families.

During the attack, which lasts from ten to thirty hours, absolute rest in that posture which experience proves to afford the least aggravation of the headache, should be maintained. A cup of hot coffee or tea, a few grains of caffeine, twenty grains of guarana, a drachm of bromide, are sometimes useful in cutting short the attack. In the intervals arsenic and strychnia may be prescribed. Healthy living, and the avoidance of "gouty" articles of food may be prescribed. A dose of any alkali seems to cure some attacks.

TETANY.

TETANY, tetanus and epilepsy show tonic spasm in full intensity. Tetany chiefly affects the extremities, the hand resembling that of the accoucheur—the thumb extended and applied to the radial side of the forefinger, the interossei overact, and flex all the fingers at the metacarpo-phalangeal joints whilst the straightened digits are drawn together into a cone; the sole is over-arched at the instep and the toes flexed. These are the postures due to the tonic spasm in many cases; sometimes the spasm affects different muscles. In tetanus the spasm comes first in the masseters and neck muscles, preceded by feelings of stiffness and soreness; tingling and burning sensations of the hands and feet often precede the spasm of tetany. All the muscles of the body may be drawn into tonic spasm in tetany, especially in severe intermittent attacks; the milder attacks are apt to be remittent or continuous. The causes of tetanus are very different from those of tetany—in which diarrhœa, rickets, cold and hysteria are important. Tetany is common in rickety infants, being often a companion of laryngismus stridulus and genuine epileptic fits. Unlike epilepsy the consciousness is not lost, and there is no clonic spasm. The facial nerves and muscles are often very irritable, a mere tap on the facial trunk exciting a contraction; other muscles are also too irritable, and their reaction to galvanism is often perverted—a contraction occurring first with make or break at the positive pole.

Because of these alterations to galvanism and to mechanical stimulation, because of the symmetry of the spasm and of its associations, and because of its sometimes being followed by muscular atro-

phy, the chief seat of the nervous discharge causing the tonic spasm is believed to be the motor nerve cells of the cord, but whether they go wrong of themselves or are tempted into wrong ways by brain or vaso-motor influences, remains unsolved.

Tetany may be due to any debility, as from over-lactation, pregnancy or parturition, therefore, nourishing food, iron and tonics are most useful in the treatment; and warm clothing with good hygienic surroundings should be remembered. Besides removing obvious causes, thirty grain doses of bromide of ammonium may be given three times a day to women, and five grains to infants, notwithstanding that the latter are liable to develop severe bromide lesions; digitalis in doses of a few minims of the tincture, and the same dose of Fowler's solution are useful.

THOMSEN'S DISEASE.

A CONGENITAL and hereditary disease in which the muscles pass into a state of tonic spasm when they are first put in action, after a period of repose. The spasm is transient and does not return so long as the muscles continue to be used. In commencing to paddle a tricycle great difficulty is required to get into action, but once in revolution the tricyclist may continue to paddle for hours; there is no real loss of power, and all other morbid nervous signs are absent.

Paramyoclonus multiplex consists of clonic spasms of isolated muscles of the limbs, occurring usually in adults, and persisting for many years; the muscular irritability and deep reflexes are increased. It has alliances with "hereditary chorea," which consists of clonic spasms, something like those of chorea occurring late in life,

affecting many members and generations of the same family, lasting many years, and often associated with dementia; it is transmitted through the female side.

Saltatoric spasm is a rare form of clonic spasm in the legs, which comes on only when the patient attempts to stand, and is characterised by springing or jumping movements.

Habit spasm or *habit chorea* is common in children and some adults; it consists in spasmodic actions, such as twitching the mouth, winking, jerking, nodding or shaking the head; they appear to be voluntary, but cannot always be controlled by an effort of the will.

NEURALGIA.

Neuralgia is pain felt in a nerve; the nervi nervorum, with their end-bulbs, enable pain to be localised to a nerve.

Causes.—Great heat or cold, pressure, injury, or irritation however produced, may act on the axis cylinder of a sensory nerve or on the sensory nerve cell, and cause neuralgia. Even when the nerve-ending in the nerve, is actually affected, the corresponding sensory nerve cell in the spinal cord must be altered in its action. Presumably, therefore, any nerve influence, any impression acting on the sensory nerve-apparatus, whether local (carious teeth, disease of ear or nose), or due to altered blood (gout, rheumatism, alcohol, tobacco) or blood vessel, may set up neuralgia; neurotic and hysterical people suffer frequently because their nervous tissues are already on the road to neuralgia, as an inherited or acquired peculiarity.

Symptoms.—The pain of neuralgia is nearly

always unilateral and paroxysmal, occurring in fits and starts; its character varies, but severity is a marked feature. Tender spots (points of Valleix) may be discovered by palpation, and these correspond to the exit of a nerve from a bony foramen, to a nerve piercing a fascia, to a nerve dividing, or to a nerve joining. These tender points are named according to their site, *e.g.*, supra-orbital, gluteal, lumbar, malleolar. Various disturbances of sensation, twitchings, paralysis, pallor, flushing, increased heat, sweating, œdema, atrophy of tissues, increase of fat, altered nutrition of the hair—shown in alopecia or canities, and herpes, with other local changes, may occur in the region of distribution of the nerve.

Tic douloureux, brow ague, prosopalgia, is neuralgia of the fifth nerve, and may be attended with severe spasms of the facial muscles, and rarely of other muscles of the head and tongue (tic convulsif).

Intercostal neuralgia and sciatica are common varieties.

Treatment.—Attention to general health, removal of causes, employment of fatty foods, nervine tonics and sedatives, are the best measures. Pure neuralgia, not due to gout, rheumatism, syphilis, locomotor ataxy, malaria, anæmia, diabetes, or Bright's disease, is best treated first by arsenic and bromide. Quinine in large doses, gelsemium and nitroglycerine are valuable.

Local applications of belladonna, aconite, veratria, chloroform liniment or menthol, may alleviate the pain. Flying blisters are most valuable. Galvanism is sometimes valuable, the positive pole is put over the seat of pain, and the negative is moved about. Hypodermic injections of cocain or morphia may be required.

Spinal irritation, rachialgia, is a nervous derangement like neuralgia, the pain being felt in

the spine, and there being much tenderness over the "buttons" of the spine; this tenderness is often more marked on the left side, especially in the hysterical. Pains and abnormal sensations may co-exist in other parts of the body. Perverted action of the stomach and uterus are very commonly present. The pain and hyperæsthesia of spinal irritation may be termed exquisite.

Extra-medullary diseases cause very much more pain than intra-medullary, which may be painless.

MENOPAUSE-NEUROSIS AND OTHER FORMS OF NEURASTHENIA.

In the nervous debility of the menopause many vaso-motor symptoms, some sensory and some mental symptoms, constitute the prominent features. Sensations of heat and chilliness reminding one of fevers; flushing and pallor, with digiti mortui; numbness and tingling of the hands and feet, frequently noticed on waking at night time; loss of memory or forgetfulness; peevishness and altered temper; insomnia. Besides the menstrual disturbances, there may be a gouty factor in the causation. The same symptoms sometimes precede and attend the development of rheumatoid arthritis. Healthy living and nervine tonics, with attempts to encourage the patient, are the best means of overcoming these symptoms, which are often collectively grouped as due to "change of life." In other forms of neurasthenia the symptoms vary immensely, but pain in the bottom of the back, languor, and bodily weakness, with curious forms of headache, are very common symptoms; at times there seems to be great capacity for work, and at other times the patient seems devoid of energy. Such cases occur at all periods of life. A history of definite neuroses may be obtained either in the individual or in the family.

ALCOHOLISM.

Alcohol has a powerful action on the nervous system; its effects vary according to the amount and frequency of the dose. When taken in a large dose its most conspicuous effects are exerted on the brain—death resulting in coma. Probably every tissue in the body is directly affected by the poison, and those tissues which have the most functional activity and which can least well bear deprivation of the normal supply of blood suffer most from the deleterious effects of alcohol. Though the evil effects of drink are mostly observed in adult life, yet children do become intoxicated and may develop visceral changes due to alcohol.

DELIRIUM TREMENS.

This generally arises from the excessive use of strong spirits, wine, or beer, but other agents and agencies may cause almost identical symptoms—pneumonia, rheumatic fever, general paralysis of the insane, excessive mental excitement, some forms of uræmia and of diabetes, poisoning by excessive use of tea, coffee, or opium. A sudden illness or a serious accident often appears to be the exciting cause of an attack in those who have indulged in ardent liquors. In drunkards it is easy to overlook a pneumonia.

There can be no question that mere deprivation of drink cannot induce an attack.

The symptoms of delirium tremens are mostly, as the name implies, mental and motor.

Sensory symptoms are not pronounced, since no mention of them is made in classic descriptions.

Weakness is probably due to the direct effect of

the alcohol on the motor nervous centres, as the tremors most certainly are. The mental state is composed of sleeplessness, hallucinations, watchfulness, and fear—presenting a grouping which is almost pathognomonic. Sleeplessness is of the essence of the disease, but there is not simply wakefulness; the patient is constantly talking or muttering, and moving about in a busy manner. He hears voices and sees sights which have no existence for others than himself; he is suspicious, and dreads the approach of individuals to his side; his manner is eager and excited; generally he answers questions rationally, but wanders immediately afterwards to some imaginary scene.

The face may be pale or flushed and wild looking; the skin is usually moist, and the pulse soft and frequent; the tongue is moist and furred, but tends to become dry and glazed.

"Generally his thoughts appear to be distressful and anxious; he is giving orders that relate to his business to persons who are absent; or he is devising plans to escape from some imaginary enemy; he fancies that rats, mice, or reptiles, are running over his bed, or that strangers are in his room."

Occasionally violent mania or melancholia replaces the usual form of delirium, which is characterised by being easily controlled by the firm conciliatory behaviour of an attendant.

The natural tendency of the disease is to end in three or four days in a critical sleep, which may last many hours, but which terminates in recovery from all the symptoms, except the weakness. The development of a typhoid state, or a rise in temperature, are signs of serious import. Uræmic coma may occur as a complication, therefore the urine must be frequently examined.

Treatment consists in the instant withdrawal of all alcoholic liquors, and in the administration of

a very nourishing diet of beef-tea, milk, eggs, and Mellin's food. Most physicians prescribe some sedative: chloral, bromide, opium, cannabis indica, hyoscyamine. Cold applications are soothing, and tonic: an icebag to the head, or the capilline tubing, cold wet pack, cold douche, or shower bath. These are most valuable in the worst cases, and in those attended with violence. A strait waistcoat should not be employed if its use can be dispensed with.

CHRONIC ALCOHOLISM.

DIPSOMANIA is believed to be a form of insanity in which the patient has a craving for intoxicating liquors; it is a cause, not a consequence, of alcoholism. Chronic alcoholism, or the repeated use of stimulants in excess, induces many changes in the tissues of the body: hepatic and gastric cirrhosis, peripheral neuritis, very possibly granular kidneys, chronic thickening of meninges, with atrophy of the brain, gray hair, and arterial atheroma and calcification, fatty degeneration of the heart, signs of cerebral apoplexy or softening. At all events these changes are frequent in those who have been notorious drinkers.

Muscular tremor is a most important symptom of chronic alcoholic poisoning; it is most marked in the morning, and in the hands, though present also in the legs, and causes unsteadiness. Insomnia, headache, noises in the ears, vertigo, and flashes of light before the eyes, are other symptoms. There may be a slight degree of that uncertainty of purpose, cowardice, and suspicion, which are evident in delirium tremens.

Morning vomiting, and morning diarrhœa, with want of appetite; venous points and lines—so-called stigmata in the cheeks; dingy, sometimes

jaundiced, conjunctivæ, red and watery eyes, acne rosacea and hypertrophy (cirrhosis) of the nose, are often due to alcoholism. Pregnant women may vomit in the morning, and women about the menopause often have acne rosacea—not due to drink. No reliance can be placed on the statements of patients who drink to excess. Obesity, especially of the abdomen, is common in beer drinkers; dram-drinkers tend to be thin. The diagnosis is sometimes difficult; the tremor may suggest general paralysis of the insane; the unsteadiness of gait, locomotor ataxy (*see* Peripheral neuritis); the morning vomiting and anorexia, nervous debility, dyspepsia, or simple hysteria.

Removal of the patient to surroundings in which he cannot obtain his poison, and in which he will obtain plenty of exercise in the open air, with regulated habits of living, are the most important points in treatment. Strychnia, quinine, and cod-liver oil, are of service.

METALLIC POISONING.

When minute quantities of metals are constantly absorbed into the blood for a long period of time, serious nervous diseases often result. Lead, arsenic, silver, and mercury, are the chief metals which damage the nervous tissues, and most of them affect chiefly the motor apparatus.

SATURNISM.

Probably lead can cause almost any morbid nervous symptom or change, but the chief nervous diseases attributed to its influence are lead colic and wrist-drop.

The wrist-drop is due to peripheral neuritis, the extensor muscles of the forearm, supplied by the musculo-spiral, waste rapidly, lose their faradic irritability, and present the reaction of degeneration; the supinator longus usually escapes. There is not any impairment of sensation, so that lead neuritis selects the motor nerve fibres. There may be tenderness of the affected muscles. Lead may cause widespread atrophy, and some believe it is the cause of some cases of muscular atrophy of the whole body.

A peculiarly dusky opaque tint of the face, and the blue line on the gums, should always be looked for; these symptoms are due to the deposition of lead in the capillaries, the discoloration resulting from the development of lead sulphide; the sulphuretted hydrogen generated by decomposing tartar about the teeth, is the source of the sulphur, so that if the teeth are kept very clean a blue line may be absent; the line is seen with a lens to be made up of a series of dots. If the teeth are closely grasped by the gums a lead line cannot form.

Colic is attended with constipation and even vomiting, the pain is very severe, and there may be tympanites; some cases have been diagnosed as chronic obstruction of the large bowel; in one case, diagnosed as lead colic, the man had a blue line and dusky face, but the symptoms were due to an epithelioma of the rectum, as was easily proved by rectal examination.

The symptoms of lead poisoning are very apt to relapse and recur. Lead predisposes to gout and to granular kidney; it may also cause optic neuritis and optic nerve atrophy with or without albuminuria. Plumbers, painters, (colica pictonum), type-founders, colour grinders are the usual sufferers from saturnism.

Dr. Todd taught that the peripheral nerves were

first affected, and that later the poison tended to affect the nervous centres. Its noxious influence thus spreading in a centripetal fashion; convulsions and coma have frequently caused death, but whether directly from the lead or indirectly, as the effect of the poison in producing arterial and renal disease, is doubtful. Besides weakness lead is credited with the property of causing tremors.

Those who handle lead should be very careful to wash their hands and clean their nails before eating, and after leaving their work. The lead is often introduced through the drinking of water stored in leaden cisterns and pipes, especially is this likely to happen if rain or pure water is thus accumulated. Perry and some wines and rum are apt to contain lead, from the vessels in which they have been prepared.

Drinking lemonade made with sulphuric acid, so as to transform the lead salt into the insoluble sulphate is also recommended.

Lead palsy is best treated by the administration of iodide of potassium, and by local massage and galvanism. The treatment of lead colic is conducted on the same principles as that of any other true colic (see p. 208); purgatives are of great service—sulphates and castor oil, and even croton oil may be used.

ARSENICAL POISONING.

This usually results from the use of green pigments for wall-papers, book-covers and paints; the poison is chiefly absorbed by the respiratory tract. Irritation of the eyes and nausea are well-known effects of the drug. Herpes zoster, pigmentation and roughness of the skin may also occur.

The nervous symptoms are very like those due to alcoholic neuritis: paralysis of the extensors of the hands and feet, and "pseudo-tabes" with ataxy and defective sensibility, especially in the muscles.

SILVER POISONING.

ARGYRIA is due almost exclusively to the use of silver as a drug; it occasionally results from continued applications to the throat.

Staining of the skin and a black line on the gums may be observed after an ounce of the salt of silver has been taken, without regard to the length of time over which the salt has been ingested. Symptoms like those of lead palsy, and albuminuria have been rarely noted.

MERCURIAL POISONING.

HYDRARGYRIA occurs in workers in silver mines, and those who make silver mirrors, thermometers and barometers; it may result from inunction of mercurial ointments. Salivation, stomatitis, ulceration with necrosis of bone, gastric and intestinal catarrh are consequences of mercurialism. Mercurial tremor is the most familiar nervous symptom; at first it is induced only by excitement and is always increased by emotion; the face and tongue are first affected, then the arms and afterwards the legs. It first occurs only on making voluntary movements — in which particularly it resembles the tremor of insular sclerosis, but afterwards it occurs during rest, and then has to be diagnosed from paralysis agitans. The interference with articulation causes a slight resemblance to general paralysis and insular sclerosis. There

is no loss of faradic irritability, mechanical irritability is usually increased.

Mercurial erythism is a phrase coined to denote the great irritability and weakness of mind which are sometimes observed. Sensory symptoms and pains in the face and limbs are common. Plumbism occasionally complicates mercurialism. The nervous symptoms may occur apart from salivation and stomatitis.

Treatment.—Removal from the source of contamination; iodide of potassium, plenty of good food and tonics, with chlorate of potash for a mouth wash.

TETANUS.

Persistent tonic spasm, heightened by violent transient exacerbations, without loss of consciousness. The exacerbation may be excited by the slightest cause or may be spontaneous. The spasm almost always begins in the muscles supplied by the fifth nerve—hence trismus or lockjaw is the first symptom; the muscles of the trunk are more affected than those of the limbs. The disease is of sudden onset, and very generally proves fatal. The motor nerve centres are in the same excitable state as that produced by strychnia. It may result from a wound—traumatic tetanus, but idiopathic or rheumatic cases are described as due to a chill. It is not uncommon, under septic conditions, in the newly born—tetanus neonatorum or trismus nascentium, and rarely it occurs after abortion or child-birth—puerperal tetanus.

Probably the disease is due to the poison called "tetanin"—an alkaloid manufactured by the tetanus bacillus, and producing its effects after getting into the blood, by virtue of some selective action on certain parts of the motor nerve centres.

In strychnine poisoning the spasm only occurs in paroxysms—intervals in which complete relaxation occurs being observed, and the symptoms never commence with trismus and soreness or stiffness of the neck. The last mentioned symptoms of tetanus suggest that at the first onset, muscular rheumatism and stiff neck may be diagnosed, but in rheumatism the muscles of the jaw are not rigid as they are in tetanus.

In a case in which a porter who had been bitten by a dog consulted the author, the chief complaint was difficulty of speaking, owing to a stiffening of the jaw muscles; the affection subsided in a week under the use of arsenic and bromide. In hydrophobia there is not any initial rigidity of the jaw, and the first paroxysms of tonic spasm occur in the respiratory muscles, and are excited first by attempts to swallow.

INSOLATION.

Sunstroke is most liable to supervene in alcoholic subjects, in those whose clothing is heavy, whose collars fit tightly, whose duties involve severe exertion, and who do not obtain a good supply of drinking water. The symptoms are probably due to the hyperpyrexia, which again is probably the outcome of the direct influence, of the sun's heat and light, on the heat-regulating centres. Transpiration by the skin is prevented by heavy accoutrements, and by the state of the surrounding atmosphere. A weak circulation, by not keeping the nervous centres sufficiently supplied with blood, would conduce to the development of the symptoms. The symptoms are sometimes like those of apoplexy, the patient falling down, deprived of sense and motion, with gasping respiration and very feeble pulse.

The symptoms may be faintness with nausea (referable to the vagus nerves), or restlessness and a tendency to delirium or mania—pointing to disturbance of the cerebral cortex. There is usually some fever, and in fatal cases even hyperpyrexia. Convulsions may occur, and death often occurs in a few hours, or may be delayed for a day or two. Recovery may occur at any stage. Loss of memory and epilepsy, and other nervous symptoms have been assigned to a sunstroke.

The treatment consists in the employment of cold—as in hyperpyrexia; a cold douche to the head, or a cold bath or a cold wet pack. Venesection has been practised, and leeches may be applied to the temples in the less acute cases. The bowels should be unloaded by an enema, and a smart purge of calomel and jalap should be administered, if necessary, by the nasal tube.

OCCUPATION-NEUROSES.

WRITER'S CRAMP or scrivener's palsy is an affection of certain muscles used in writing; the characteristic variety consists in a spasmodic action of muscles holding the pen, preventing the performance of the writing movements. The muscles may be useful enough for other kinds of movement. Sometimes there is no pain except that of the spasm. At other times writing is impossible, because of the severity of the pain.

Sempstresses, violinists, pianoforte players and others are liable to similar affections.

Observe that pain, spasm or weakness may be the chief fault, and that these symptoms occur only when the particular occupation is attempted. A mere sense of fatigue or weakness may be the first manifestation, and this occurs at a varying interval after commencing the occupation.

The occupation should be given up for some period of time. Even if the other hand be used to write with, it often goes the same way.

Some cases are not pure specimens of the disorder but are due to neuritis; the nerves may be found tender, and sometimes electrical alterations in the nerves and muscles may obtain. Writing with a ball-shaped pen-holder is one way of tending to prevent this neurosis. For further information consult the works of Gowers and Poore. The former recommends the practice of writing from the shoulder, the whole arm being moved in carrying the pen from left to right.

Section XV.

DISEASES OF THE SKIN.

ACNE PUNCTATA.

Acne punctata consists in an accumulation and retention of sebum in the sebaceous glands, the part of the sebum exposed at the mouth of the follicle is seen as a black point (*comedones*). *Acne indurata* results from inflammation about a sebaceous gland, and *acne pustulosa* from suppuration. The face and thick skin of the back and front of the chest are the chief seats of acne, in either sex, at the age of puberty. These affections are very seldom seen in children, and they do not affect the palms and soles.

Acne artificialis is an acne-like eruption due to the use of bromide and iodide of potassium. Acne does not itch.

Every night the affected parts must be thoroughly washed with very hot soap and water; then they should be scrubbed with soap and a soft nail brush or loofah for several minutes; the parts should then be wiped clean and dry, and a lotion composed of three drachms of precipitated sulphur, two drachms of glycerine, one ounce of spirits of wine, and three ounces each of lime water and rose water should be thoroughly sponged on and allowed to dry and remain there all night. Ether may be used to free the skin from grease, but this should be done before applying the sulphur. The following ointment may be tried if the lotion fails: two drachms of hypochloride of sulphur, ten grains of carbonate of potash, ten drops of oil of bitter almonds, and one ounce of prepared lard. The application should be washed off in the morning with warm gruel or thick oatmeal or bran water.

In very intractible cases the vigorous rubbing of the following lotion into the skin every night is efficacious: one ounce of potash soap, and of spirits of wine with six ounces of water, and ten drops of lavender oil. Any dyspeptic or uterine trouble should be rectified, and the bowels kept regular; the confection of sulphur is useful for this purpose. If there be debility or anæmia five minims of Fowler's solution, and five grains of tartrate of iron may be prescribed in a mixture three times a day.

ACNE ROSACEA.

This is a chronic inflammation of the skin leading to the formation of papules and dilated venules. Unlike ordinary acne it causes much burning and smarting. There are two varieties: one may be

called hypertrophic sclerosis, causing a hobnailed nose, and is due like the hobnailed liver, to the use of ardent spirits. The exposed parts of the face are the seats of the affection. The other variety occurs in women with menstrual and gastric disorders; it often assumes the shape of a butterfly as it affects the sides of the nose and both cheeks almost symmetrically; the sebaceous glands pour forth much secretion, and yellow points may be noticed in the red patches. Taking wine and food and exposure to cold weather causes increased hyperæmia and burning sensations. In women the best local application is thick bismuth and calamine lotion; the digestion and menstrual functions require attention; in men alcohol must be prohibited, and the veins snicked with a lancet so as to relieve the congestion. An ointment of hypochloride of sulphur, 3 j. to the ounce of lard, is sometimes useful.

ERYTHEMA.

Erythemata may be excited by cold, heat, friction, scratching, the irritation of flannels and parasites; acute specific fevers, catarrhs and sore throats; digestive disturbances, dentition, and last but not least, rheumatism. The rapid appearance and disappearance of the eruption is a noteworthy feature, but the duration of erythema is longer than that of urticaria. Hyperæmia and very slight effusion are the anatomical features; the redness is not very deep and disappears on pressure.

The eruption is generally symmetrical in distribution. Erythema multiforme includes erythematous papules (E. papulatum), circles (E. circinatum), and gyrate outlines (E. gyratum and marginatum). These are common in rheumatism, and are very

fugacious; they may itch and are sometimes tender.

Many erythemata have a tendency to pass on the one hand into vesicular eruptions (E. vesiculatum, hydroa), on the other into purpuric rashes (peliosis rheumatica and possibly E. iris). The original shape of the pink patches is circular, and they tend to spread at the periphery and fade in the centre, hence the appearance of rings of which there may be a constant succession.

Erythema nodosum consists in the development of large hard tender lumps in the skin of the front of the legs and thighs and backs of the forearms and arms; they come out in successive crops; the lumps have bluish borders, and in disappearing the colours of a fading bruise are reproduced. The temperature is usually about 100°, but may be higher. The affection is rare before five years of age; it is of rheumatic nature. The disease has been diagnosed as acute periostitis, but this is scarcely pardonable.

Urticaria consists in the development of whitish bumps or wheals which rapidly appear and disappear; scratching or writing on the skin may cause similar formations (factitious urticaria); the term nettlerash indicates its stinging and itching characteristics.

Its causes are very numerous. In its most chronic and intractable forms it is associated with menstrual and gastric derangement, and it has relations also with asthma.

Shell-fish in some individuals excite an acute attack; copaiba and hydatid fluids may also cause urticaria.

In children chronic urticaria is called lichen urticatus, because of the presence of hard itching papules; scratching often leaves its mark behind in dried blood.

Rheumatism may cause erythema, urticaria and

purpura; the same case may exhibit all three kinds of eruption.

The treatment consists in relieving itching by lotions, ointments or powders of a soothing nature, and by the regulation of the diet, clothing, sleep and exercise. It is essential to remove every kind of local or internal irritation.

The following are some of the best local applications:—

One per cent. solution of carbolic acid; a drachm of liquor carbonis detergens to two or three ounces of water; boric acid, carbonate of potash and glycerine, of each one drachm, with water six ounces.

These should be sponged or dabbed on the itching parts and allowed to dry on. Merely bathing the parts in hot or cold water may relieve itching but may also increase it.

The acute form of urticaria should be treated by the administration of an emetic, if the stomach still contains the offending articles. An alkaline salt and an aperient should be prescribed.

The internal administration of large doses of alkalies is the first step in the medicinal treatment of chronic urticaria; after this an aperient mixture may be given; then an alterative such as arsenic or perchloride of iron.

℞ Sodæ Sulphatis, ʒiij.
Ferri Sulphatis, gr. xii.
Acidi Sulphurici dil., ʒss.
Infusi Quassiæ q.s. ad ʒviij.
Pars sexta bis die.

If the patient is gouty, plethoric and fat, the following is useful:—

℞ Magnesiæ Sulphatis, ʒiij.
Magnesiæ Carbonatis, ʒj.
Tincturæ Colchici, ♏xxxvj.
Olei Menthæ Piperitæ, ♏ij.
Aquæ, ʒvj.
ʒss. ter die.

If there be dyspepsia:—

℞ Sodæ Bicarbon., ʒiij.
Spt. Ammon. Arom., ʒiij.
Acidi Hydrocy. dil., ♏viij.
Syrupi Zingib., ʒiij.
Tinct. Calumbæ, ʒiij.
Aq. ʒvj.
ʒj. horâ ante cibos bis die.

ECZEMA.

Eczema is a catarrhal inflammation of the skin, which nearly always weeps and forms crusts. It affects by preference the thin skin and therefore the flexor surfaces of the limbs; where the skin is thick as on the back, eczema may be papular; on the back of the wrist (lichen agrius) the weeping may be almost absent. Eczema is due to irritation, either external or proceeding from the blood, as in gouty eczema and many forms of infantile eczema. If the irritation is severe much redness and much exudation with yellow crusts appear (E. rubrum); if the irritation is moderate, but the patient weak or scrofulous, pus forms and gives rise to dark coloured scabs (E. impetiginodes vel pustulosum). The discharge stiffens linen.

Treatment.—Remove all scabs by oil soakage or poultices: avoid water and soap; protect from the atmosphere; if the parts are angry use soothing local remedies, *e.g.*, ung. diachyli, give diuretics and keep the bowels freely open. If there be debility prescribe simple tonics, if scrofula cod-liver oil and iodide of iron syrup.

HERPES.

This consists in the appearance of circumscribed areas of one or more groups of vesicles seated upon an inflamed base; smarting and itching

are present; there is fever which may be very severe and attended by a rigor; the pyrexia subsides when the eruption breaks out. The vesicles do not burst but dry up, forming light crusts, which fall in a few days, leaving a reddish stain. In severe cases scarring may result; this is not very rare in herpes zoster. The crops of vesicles sometimes affect the mucous membrane of the mouth.

The lips (H. labialis), prepuce (H. progenitalis) and parts supplied by intercostal nerves are the commonest sites of herpes. The shingles—zona—(H. zoster) is unilateral, being arranged along the course of an intercostal or other spinal nerve. In children this affection causes but little pain, but adults are liable to suffer severely from neuralgia, especially after the subsidence of the eruption. The herpes is said to be caused by inflammation of the ganglion of the posterior root of the corresponding spinal nerve. A second attack is rare.

A soothing local appplication, diuretics and tonics constitute the treatment.

Thus:—Dust the part with starch powder, or anoint with ung. diachyli and cover with a bat of cotton-wool or lint. Citrate of potash and liq. ammoniæ acetatis are good salines. Quinine and arsenic are the best tonics.

PEMPHIGUS.

Oval bladders or bullæ varying in size from a split pea to a pigeon's egg (T. Fox) are called pemphigus. The transparent contents become opaque, then the bulla becomes flaccid and dries up, leaving a scab. In the newly-born it is generally syphilitic, and it may be the first manifestation of congenital syphilis.

P. solitarius is a chronic disease; successive

crops of the blebs appear on the limbs. P. foliaceus affects the whole body; the bullæ are ill-formed, and an incrustation of the surface of the body results from their spread, so that the skin seems to be affected with eczema. Arsenic is the best drug. A supporting plan of treatment and soothing local applications are required.

IMPETIGO.

Impetigo is eczema going on to suppuration; its chief variety is impetigo contagiosa, which affects many children in the same family; the face and head are the parts attacked. The scabs look as if they were "stuck on"; the affection begins as "little watery heads"; the disease is inoculable.

Remove the scabs by soaking them in oil, and apply diluted white precipitate ointment to the exposed raw surface; this should be done three times a day. A tonic should be given also.

ECTHYMA.

Ecthyma consists of large isolated pustules with hard, inflamed, painful bases; the crusts are dark and adherent. Acari in children and pediculi in adults are the commonest causes. The health is always below par. Any antiseptic ointment may be applied after removing the scabs. Good food, a little wine and tonics should be given.

STROPHULUS OR RED GUM.

Strophulus or red gum consists in the development of small red pimples on the face, neck and arms of babies, due to stomach disturbance. The

feeding should be regulated.* An aperient and an alkali should be prescribed for internal, and a soothing lotion for external use.

S. albidus consists of white specks on the face of infants, due to distended sebaceous glands; they may appear around any chronic skin disease (*see* Acne—comedones).

LICHEN.

LICHEN is characterised by the appearance of hard, inflammatory, itching papules which have no tendency to become vesicular, but begin as papules, and so remain till they disappear. L. simplex consists of scattered pale flesh-coloured papules chiefly on the trunk; when the papules are grouped, L. circumscriptus is the name given.

A rasp-like surface due to the development of papules, from accumulation of secretion about the hair follicles is not a true lichen (L. pilaris). L. tropicus or "prickly heat" is an affection of the sweat glands (T. Fox).

L. planus or **ruber** is characterised by the development of large, solid, dull-red papules with angular edges and shining flat tops; they form patches by coalescence, not by increase of each papule; the disease is severe and very intractable, affecting only those out of health. The epidermis of the palms and soles becomes greatly thickened and scaly (keratosis).

For the simple forms of lichen, purgatives, alkalies and tonics is the treatment. Local soothing lotions are required to relieve itching. In L. planus the chief indication is to remove the cachexia by rest, good food, change of air and arsenic. Bran or gelatine baths and soothing ointments are valuable; the thick epidermis may be shaved off the palms and soles.

* See Author's *Treatment of Disease in Children.*

PRURIGO.

PRURIGO is a rare disease; small, pale, hard papules may be better felt than seen; the itching is most marked. Arsenic internally, alkaline baths and sedatives locally.

PHTHIRIASIS.

PHTHIRIASIS—prurigo senilis—is an eruption due to pediculi corporis; the neck and shoulders are the favourite seats; hæmorrhagic specks and papules are the chief anatomical results of the itching and scratching. The louse inserts its proboscis into a pore of the skin and sucks blood. Pustules may develop if the health is low. Baking the clothes, and anointing the skin with a parasiticide ointment is the treatment. Good food should be ordered.

℞ Sulphur. Sublimat., ʒss.
Hyd. Ammon., gr. v.
Creasoti, ♏v.
Olei Olivæ, ʒij.
Adipis præpar., ℥ij.

or ℞ Olei Olivæ, ℥ss.
Adipis, ℥ss.
Pulv. Staphidis Agriæ, ʒij.

PSORIASIS.

PSORIASIS is a very chronic inflammation of the skin, characterised by the development of patches, on which many silvery scales form; on removing the scales of shed epidermis the cutaneous papillæ are seen to be hypertrophied and very red, being infiltrated with inflammatory corpuscles; unlike L. ruber the patches increase in size by spreading at the edge.

The chief seats of the disease is the thick skin of

the backs of the elbows, front of the knees and head; the disease is often hereditary. P. guttata is the name given if the patches look like drops of mortar stuck on the skin. If large and round, P. nummularis or circinata. P. vulgaris if a great extent of surface is covered. P. palmaris if the palms are affected, this is generally due to syphilis. The disease differs from chronic eczema in that it never weeps.

The treatment consists in the internal administration of cod-liver oil, malt, quinine and arsenic, especially in children. Locally alkaline baths and removal of the scales, with some weak tar application or weak chrysophanic acid ointment (gr. x. ad ʒ j.). Chrysophanic ointment often causes a dusky hyperæmia about the site into which it is rubbed, followed by pigmentation and scaling.

If there is much redness and irritation, soothing applications locally and alkalies internally, is the treatment required. If dyspepsia or gout exists, such treatment as is recommended under urticaria should be tried.

℞ Picis liq., ʒj.
Camphoris, gr. x.
Lard, ʒx.
Fiat Ung.

(T. Fox).

PITYRIASIS.

Pityriasis is a generic term signifying cutaneous lesions causing desquamation. P. rubra is a severe disease which begins as a red spot, this rapidly spreads until the whole surface of the body is involved; intense redness and free exfoliation of layers of epidermis are the chief features.

At first diuretics internally and the inunction of an alkaline oil is the treatment; later, quinine should be ordered.

Syphilitic eruptions are characterised by the great variety of their manifestations, their coppery colour, their tendency to cause pigmentation, their not itching, their serpiginous outlines and circular arrangement, and their tendency to affect certain regions: forehead, palms, soles.

Scrofuloderma.—This affection begins as painless hard lumps which suppurate in the centre and give rise to ulcers with flabby granulations. The family history, glandular enlargements and physical signs are of diagnostic value. The lesions being due to the tubercle bacilli, should be scraped away and dry antiseptic dressings applied. All sources of local or internal irritation should be removed; therefore the parts should be kept at rest and the digestion regulated. Cod-liver oil, iodide and arsenic are prescribed with sea air and a dry residence.

ICHTHYOSIS.

In ichthyosis or fish-skin-like-disease there is an incrustation of blackish colour on the fronts of the knees or in other parts of the body. The incrustation is composed of epithelial scales and sebum. *Xeroderma* is a congenital dryness of the skin the perspiration and sebaceous secretions being ill-performed or altogether absent; the papillæ of the skin are swollen; the disease is incurable. Anointing the skin with glycerine or vaseline, and the frequent use of bran baths is the treatment.

CORNS.

Corns consist of overgrowth of epidermic scales with some swelling of the papillæ of the *cutis vera*. *Warts* or *verrucæ* are due to overgrowth of epithe-

lial scales and of the papillæ of the *cutis vera*; they may be removed by the repeated application of acid nitrate of mercury or glacial acetic acid.

SCLEREMA NEONATORUM.

Sclerema neonatorum is characterised by the development of hard plaques in the true skin; the plaques spread and may involve large tracts of skin and may encase the limbs and trunk; the colour of the skin is bluish red; a thin fold of skin cannot be picked up owing to the rigidity and thickening. Infants often, not always, die from this affection. The respiration and circulation become enfeebled and the temperature falls. Atelectasis is often found after death. Warmth, stimulation, friction with oils and careful feeding, constitute the treatment.

SCLERODERMA.

Scleroderma is a somewhat similar disease to sclerema; the induration is generally more limited, the colour of the skin is more like ivory; the nape of the neck, face, limbs, or the front of the chest are seats of the disease. Tonics internally, friction with oil externally; it is often irremediable, but may disappear of its own accord. *Morphœa* is a localised scleroderma, it occurs as white elevated indurations mostly on the limbs of weak females.

PRURITUS.

Pruritus accompanies most skin diseases, but may exist as an isolated cutaneous symptom, causing much distress. Jaundice, indigestion, gout and uncleanliness are common causes. Diaphore-

tics, diuretics, aperients and warm baths relieve the itching in some cases (*see* Therapeutic Index). That itching may be due to scabies, local lesions due to the acarus not being obvious, was insisted upon by Dr. T. Fox.

LUPUS.

A GRANULATION tissue of small round cells develops in the true skin and causes patches which tend to spread and undergo fatty degeneration; thin pale scars result which do not pucker the surrounding skin. L. erythematosus specially involves the sebaceous glands about the face, the affected area of which is much congested and infiltrated; some scaliness and incrustation may be noted; the orifices of the sebaceous glands are very noticeable by reason of their being plugged with sebum. It looks something like acne rosacea.

L. non-exedens consists in the development of fleshy lumps in the skin of the face and nose; it is common in the young; the tissue is very vascular and gelatinous; it is regarded as a local tuberculosis; it is not liable to suppurate. If much ulceration occurs the disease is called exedens.

The new growth should be scraped away but not if there is much tenderness and redness; if these symptoms exist the air should be excluded by some soothing lead application. Cod-liver oil, malt and iron should be prescribed, and if the lupus is superficial and slight, the application of zinc and lead ointments may be sufficient to cure the disease.

Melanoderma often goes with **leucoderma,** the former denoting an excess of pigment, the latter an absence of it; in pregnancy melanoderma may occur about the forehead as well as an increased formation in parts which are natur-

ally pigmented. In Addison's disease melanoderma is a symptom.

Hyperidrosis is excessive, **Anidrosis** deficient secretion of sweat. **Sudamina** result from the collection of sweat beneath the superficial layers of the cuticle. **Chromidrosis** consists in the formation of coloured sweat. **Osmidrosis** is the term used to signify powerfully smelling perspiration.

Seborrhœa consists in an excessive secretion of sebum making the skin too greasy or giving rise to scales of fat which may cause incrustation. "Dandriff" or "scurf" is due to seborrhœa. It is common in new-born infants. Tonics, removal of the scales and an astringent application is the treatment:—

℞ Acidi Tannici, ʒi.
Acidi Acetici, ʒiv.
Aq. Destil., ʒviii.
Fiat Lotio.

Molluscum Contagiosum.—The sebaceous glands are enlarged and distended, causing the formation of sessile, whitish, umbilicated tumours. On squeezing them a whitish sebum first escapes and this is followed by a translucent pinkish lobulated substance composed of round cells about to undergo fatty infiltration. The face of children is most frequently affected; it is contagious. Touch the small tumours with acid nitrate of mercury, turn out the contents of the large ones; the bleeding resulting from this little operation should be stopped by pressure.

THE NAILS.

The nails may be ill-formed, opaque and brittle in psoriasis and other scaly skin diseases. In congenital syphilis they may be narrow, small,

opaque, cylindrical. The nail-bed may suppurate —*onychia*—in struma, syphilis, or erysipelas. **Onychomycosis** is a fungus disease of the nails causing them to become opaque and brittle, like the hairs in ringworm.

SCABIES.

Scabies is due to the burrowing of the itch insect—the acarus or sarcoptes scabiei. The lesions of scabies like those of syphilis are prone to be multiform and to affect the palms and the soft skin between the digits, but scabies causes distressing itching, worse at night-time and when the affected parts are warm. The scratching is responsible for the character of many of the eruptions. The cuniculus or burrow is a slightly raised, straight or tortuous line, often discoloured by dirt and the excreta of the female acarus. The front of the wrist, the front of the belly, and the front of the pendent penis as well as the inter-digits, are the places to examine for the burrows. The buttocks and feet of infants may be the only seats of the disease. Papules, vesicles and pustules either as isolated lesions or sometimes suggesting eczema or urticaria, are the commonest varieties of cutaneous lesions. The state of health of the affected individual largely determines the kind of eruption; the debilitated and strumous develop pustular rashes, whereas the strong and healthy may complain only of the pruritus and the most careful examination may reveal nothing more than a furrow, a pimple or a vesicle. Pruritus worse at night-time, should always suggest the presence of the itch.

Treatment.—A thorough washing of the whole body with soap and water is the first step in the

treatment of general scabies. The affected parts should receive special attention, the burrows being broken into by the use of soft soap and a soft nail brush.

A free inunction of sulphur oil should then be practised—thirty grains to one drachm of flowers of sulphur to the ounce of olive oil. This process may be repeated for two or three nights.

It is important not to cause irritation by over-doing the sulphur application. Tender and hot parts should be soothed with thick calamine lotion. A weak ointment ʒ j. to ℥ j. of balsam of Peru or ʒ ij. of storax to ℥ j. of lard is serviceable especially in chronic scabies. Cod-liver oil and iodine should be prescribed if struma exists, and tonics if there is debility.

TINEA TONSURANS OR RINGWORM.

Circular patches on the hairy scalp on which the hairs are opaque and brittle and broken off short. The trichophyton tonsurans invades the epidermis, the hair and its root follicles; the conidia or sporules may be seen in these parts if bits be removed and soaked in a clean drop of liq. potassæ and then examined with the microscope. The disease is often most difficult to cure, recent cases may be cured readily by any strong parasiticide, such as tincture of iodine. In severe cases the scalp should be shaved. Epilation may be practised so as to prevent the spread of the disease into the hair follicles. If the disease is extensive the whole scalp may be bathed with sulphurous acid lotion—made by mixing an ounce of hyposulphite of soda with two drachms of dilute sulphurous acid in six ounces of water. Applications of Coster's paste—iodine ʒ j., colourless oil of wood

tar ℥ j.—may be made every four days after the scurf, grease and scabs have been removed by poultices or oil soakage. Salicylic acid, ʒ j. to ℥ j. of vaseline is a useful ointment in mild cases, it should be thoroughly rubbed into the diseased area.

Tinea kerion is simply inflamed tinea tonsurans and appears as a boggy patch in which the inflammatory exudation is often mixed with pus. The formation of it by artificial means, *e.g.*, the application of croton oil, is a powerful means of destroying the tinea.

Tinea circinata is ringworm on the skin, it is usually noted as a raised, red, scurfy and itchy ring, but the irritation may be severe enough to cause vesicles. Cleansing the patch with soap and water, and painting it with iodine pigment easily effects a cure.

TINEA VERSICOLOR—CHLOASMA.

This is caused by the microsporon furfur. The microscope shows racemose collections of large sporules and scanty wavy mycelial threads. Fawn coloured patches on the chest and parts covered by flannel are its conspicuous features. It is not a syphilitic macula because it is raised, itchy and scurfy.

Flannel should be discarded for silk garments or should be faced with silk or cotton. A lotion of hyposulphite of soda ʒ j. to ℥ j. should be applied simultaneously with one of dilute sulphuric acid ♏x. to ℥ j. after the skin has been freed from dirt and grease by soap and ether.

Sycosis is inflammation of the hair follicles of the beard and whiskers. It may be caused by a vegetable parasite—tinea sycosis.

Vitiligoidea or Xanthelasma.—Buff coloured patches on the eyelids due to fatty infiltration of newly-formed cells, and met with in those who have had jaundice, diabetes, migraine or gout. **Multiple xanthoma** is commoner in children; yellowish or lemon coloured patches occur in many parts of the body, the eyelids being very seldom affected.

ALOPECIA AREATA.

Alopecia areata consists in the presence of areas of baldness, it is frequently due to nerve shock or worry, and occurs in those of neurotic stock; it generally ends in recovery; any micro-organism that may be found is a mere epi-phenomenon. A stimulating lotion of cantharides externally and tonics internally, is the treatment.

RASHES CAUSED BY INGESTION OF DRUGS.

Atropine or belladonna and sometimes also stramonium and hyoscyamus cause most marked erythema or hyperæmia, very like a scarlatinal rash. Copaiba gives rise to an eruption something like measles but of redder tint; the rash has a preference for the articular regions, the urine smells of copaiba, nitric acid precipitates the resin from the urine but boiling does not.

Iodide of potassium may cause purpura and pustules like acne, especially about the forehead and face; bromides may set up erythema or more commonly an acneform eruption, and these yellowish pocks may by coalescence produce a plaque, even as large as a florin or larger, the edge nearly always shows yellow points.

Arsenic may cause much pigmentation, much desquamation, also purplish stainings and herpetic vesicles. Quinine, antipyrin and salicin may produce hyperæmia and erythema. Chloral hydrate has caused dusky erythema and urticaria. Mercury and tar may excite dermatitis. Silver may cause a peculiar pigmentation. Suspension of the drugs is the treatment.

MEASLES.

Measles is best compared and contrasted with small-pox. The incubation period of both is about the same (12 days); but measles is perhaps a day or two less, and less punctual. If the mucus of measles be inoculated, eight days is the period of incubation, the same as in inoculated small-pox. In both affections a period of three to four days elapses before the rash comes out. In both the rash may first be seen on the fauces as raised dark red spots. The rash of measles is fairly punctual on the fourth day and is first seen about the roots of the hairs on the forehead. With the appearance of the eruption the primary fever of small-pox suddenly subsides, but with the eruption of measles the temperature usually rises to a greater height and may reach 104° or so.

The eruption of both diseases is a papular one; in measles these coalesce and form patches with sharply defined edges, often having a crescentic outline and the colour is purplish or mulberry. The contagion of measles is less persistent but spreads with greater rapidity than does that of scarlatina or small-pox.

Since catarrhal signs—coryza, injected conjunctivæ (and sometimes injection of the face, minute dusky points preceding the true eruption) and a swollen aspect of the face—are the first signs of measles, and if these catarrhal signs are slight, mere catarrh and whooping cough may resemble it for the first days of its presence. Its diagnosis from German measles is chiefly made by the slightness of the catarrhal signs, the early appearance of the rash and the swelling of the post-cervical glands of the latter.

In roseola, fever and catarrh are absent.

The fever of measles usually subsides within ten days of the appearance of the rash. A fine slight desquamation may be observed and some staining of a yellowish-brown tint, suggestive of fading bruises, may remain a week after the fever has gone. This is due to the exudation of hæmoglobin, if not of red blood disks, into the tissues affected by the rash.

Measles disturbs all the mucous membranes of the body and diarrhœa is very apt to set in. In respect of its complications and sequelæ it resembles whooping cough more than any other specific fever.

Diphtheritic membranes may develop on the fauces and larynx whilst the measles is still present, or diphtheria may appear after the fever has subsided. Catarrhal pneumonia, epistaxis, ophthalmia and convulsions are some common complications.

Otitis also occurs but is less severe and less persistent as a rule than in scarlatina.

The chief sequelæ of measles are diarrhœa, bronchitis, enlargement of bronchial and tracheal glands, phthisis, tuberculosis, whooping cough and gangrene of the mouth or genitals (cancrum oris, noma, noma vulvæ).

Many varieties of measles are described: be-

nign, malignant, morbilli sine catarrho, morbilli sine morbillis.

The malignant forms are those attended with hæmorrhages—so-called purpuric or black measles—perhaps indistinguishable from small-pox—and those in which the rash does not evolve—severe brain symptoms—coma and convulsions, terminating the scene. The tendency of any kind of measles is to produce drowsiness rather than exhilaration; indeed the drowsiness is of great diagnostic value, in the presence of a catarrh.

In the grown up, measles is a more severe affection, even in the benign forms; in those countries in which it struck new ground the epidemics were more severe and the disease more fatal. Sometimes a typhoid state develops and causes death within two weeks, the fever never having disappeared.

The treatment is like that of scarlatina; patients should not mix with others till twenty-one days from the onset of their illness. They should remain in bed whilst the fever lasts.

The catarrhal signs should be treated precisely like a common cold; the cough is often "clangy" from the co-existence of laryngeal spasm, and this may be noted in the first days, suggesting the presence of "croup" and whooping cough. By "croup" must be meant, on this occasion, either simple spasm, simple catarrh or true croup. It requires no stretch of the imagination or straying beyond the facts, to recognise that either of these conditions may be present with measles.

THERAPEUTIC INDEX.

In writing this index the author has had a twofold object: (1) to amplify the therapeutics of the text; (2) to submit a few examples of prescriptions written "in Latin" without abbreviations. Rather than produce an extensive therapeutical index, it has been thought preferable to introduce those methods and agents with which the author has had most personal success in treatment. In drawing up the Latin prescriptions and instructions the author wishes to acknowledge the use he has made of the works of Tanner (1861) and Handsel Griffiths (1875).

Macera per horam et cola	Macerate for an hour and strain, (as in making an enema of tobacco with boiling water).
Sumat cochleare parvum pro re natâ vel omni nocte	Take a small spoonful occasionally or every night.
Quartâ quâque horâ sumenda	To be taken every four hours.
Capiat semiunciam bis die post cibum	Take half an ounce twice a day after meals.
Pars sexta, ter die	Sixth part three times a day.
Fiat mistura cujus capiat partem quartam ter in die ex cyatho parvo aquæ	Make a mixture of which let patient take a fourth part three times a day in a small glassful of water.
Sumat poculum (uncias quatuor) bis terve in dies	Take a small cupful (8 tablespoonfuls) twice or three times a day.
Horâ secundâ post cibum sumitur	Let it be taken every second hour after a meal.
Omnibus sextis horis sumendus	To be taken every six hours.

Capiat cochleare parvum bis die, in quovis vehiculo grato	A small spoonful to be taken twice a day in whatever vehicle the patient may find agreeable.
Sumat pilulas duas ter die	Take two pills three times a day.
Fiat pilula, omni nocte sumenda	Make a pill to be taken every night.
Misce secundum artem et divide in pilulas viginti	Mix according to the rules of art and divide into twenty pills.
Divide in pilulas viginti quarum capiat unam ter in die	Divide into 20 pills of which let patient take one three times a day.
Dum flatus infestat	Whilst the flatulence is troublesome.
Mane meridieque sumendus	To be taken morning and midday.
Omni quadrante horæ donec dolor exulaverit	Every quarter of an hour till the pain is relieved.
Urgente flatu	The flatulence being troublesome.
Vomitio urgente	The vomiting being urgent.
Absente febre	The fever being absent.
Adstante febre	The fever being present.
Ad libitum	At pleasure.
Alternis horis	Every other hour.
Omni hora	Every hour.
Omni bihorio	Every second hour.
Partes æquales	Equal parts.
Partitis vicibus	In divided doses.
Balneum mariæ	A warm-water bath.
Balneum vaporis vel vaporosum	A vapour bath.
Bis indies	Twice a day.
Biduum	Two days.
Bulliat	Let boil.
Calefactus	Warmed.
Collyrium	Eye-wash.
Collutorium	Mouth-wash.
Congius	Gallon.
Octarius	Pint.
Continuantur remedia	Let the remedies be continued.
Dejectiones alvi	Stools.
Donec ad alvi solutionem	Till the stools become liquid.
Durante dolore	Whilst the pain lasts.
Extende super alutem mollem	Spread on soft leather.
Lateri dolenti	To the painful side.
Sesuncia	An ounce and a half.
Subinde	Frequently.
Vas vitrium	A glass vessel.

PARTS OF A PRESCRIPTION.

The sign ℞ = the superscription and is interpreted as Recipe. The names and doses of the drugs prescribed constitute the Inscription. The directions to the dispenser comprise the Subscription; and the instructions for the patient are denominated the Signature.

The inscription is usually composed of the basis or active ingredient, the adjuvant or auxiliary, the corrective and the vehicle. Example of prescription (Handsel Griffiths).

Superscription. ℞.

Inscription {
Basis—Magnesiæ sulphatis, uncias quatuor.
Adjuvant—Tincturæ sennæ, uncias duas cum semisse.
Corrective—Tincturæ cardamomi compositæ, drachmas decem.
Extracti glycyrrhizæ, semi unciam.
Vehicle—Infusi sennæ, ad uncias viginti.
}

Subscription. Misce, fiat mistura.

Signature. Cujus capiat æger cochlearia duo magna bis terve in horâ, donec adsit catharsis.

Patient's name. Prescriber's initials.

Date.

LATIN PRESCRIPTIONS.

℞ Potassæ Bicarbonatis, grana decem.
Spiritûs Ammoniæ Aromatici, minima quindecim.
Tincturæ Belladonnæ, minima quinque.
Aquæ Menthæ Piperitæ, fluidunciam.
Misce, fiat haustus. Capiat æger ter die (in chronic gastric catarrh).

℞ Sodæ Bicarbonatis, grana quindecim.
Liquoris Morphiæ Hydrochloratis, minima decem.
Acidi Hydrocyanici Diluti, minima quinque.
Misturæ Camphoræ, fluidunciam.
Misce, fiat haustus, statim sumendus (for gastrodynia).

℞ Ammoniæ Carbonatis, gr. v.
Tincturæ Aurantii, ʒss.
Infusi Cascarillæ, ℥j.
Misce, fiat haustus, mane sumendus (in acid pyrosis with debility).

℞ Pilulæ Hydrargyri,
Pilulæ Rhei Compositæ,
Extracti Hyoscyami, ana, grana duodecim.
Misce, fiant pilulæ octo, duæ alternâ quâque nocte sumendæ.

℞ Pulveris Ipecacuanhæ, granum.
Pulveris Rhei, grana tria.
Confectiones Rosæ, quantum sufficiat ut fiat pilula.
Ante prandium sumenda.

℞ Extracti Nucis Vomicæ, grana tria.
Extracti Hyoscyami, scrupula duo.
Pilulæ Colocynthidis Compositæ, scrupulum.
Misce, ut fiat massa, in pilulas duodecim dividenda. Capiat pilulas duas omni nocte.

℞ Ferri Sulphatis, grana decem.
Sodæ Sulphatis,
Magnesiæ Sulphatis, ana, unciam.
Sodii chloridi, drachmas duas.
Aquæ, octarium.
Misce, sumat uncias duas in aquâ calidâ uncias decem primo mane.

ANTHELMINTICS (after Tanner).

℞ Kousso, in pulvere, drachmas quinque.
Mellis, quantum sufficiat ut fiat electuarium; fiat doses duas.

℞ Pulveris Spigeliæ, grana decem.
Pulveris Stanni, drachmas duas.
Syrupi Zingiberis, semidrachmam.
Mellis, quantum sufficiat ut fiat bolus, horâ ante jentaculum sumendus. Postea adhibeatur mistura purgans ad plenam alvi solutionem.

℞ Decocti Granati Radicis, unciam.
Omni semihora sumendus usque doses sex (vel omni semihorâ ad sextam vicem).

℞ Extracti Liquidi Filicis Maris, semidrachmam.
Syrupi Zingiberis, drachmas duas.
Misturæ Acaciæ, unciam cum semisse.
Misce, fiat haustus, primo mane sumendus.

℞ Acidi Arseniosi, gr. j.
Quininæ, gr. xx.
Ferri Sulph. Exsicc., gr. xl.
Extracti Lupuli, gr. x.
Extracti Gentianæ, q.s.

Fiat massa, in pilulas viginti dividenda; sumat unam bis die post cibum. Useful in many chronic skin diseases.

Albuminuria.

Gallic acid, gr. x.; infusion of jaborandi, ʒj.; nitrate of pilocarpine, gr. $\frac{1}{12}$ under the skin; ozonic ether, ♏xxx.; nitroglycerine, one minim, one per cent. alcoholic solution; nitrite of amyl, inhalation of three minims.

Alcoholism.

Liquor arsenicalis, ♏v.; tincture of capsicum, ♏x.; liquid extract of cinchona, ♏v.; extracti hydrastis liquidi, ♏x. to ♏xxx.; lupulin, gr. ij. in pill; liq. morphinæ hydrochloratis, ♏x.; liq. strychninæ, ♏v.; pilula phosphori, one grain; picrotoxin, gr. $\frac{1}{50}$ in water; hyoscinæ hydrobromas, gr. $\frac{1}{100}$ in water or pill. Some of these drugs may be used in combination.

Biliousness.

Euonymin, gr. j.; hydrastis, gr. x., or hydrastine, gr. 1 to 5 in pill with glycerine of tragacanth; juglandin 2 to 5 grains in pill with mucilage; leptandrin, gr. ¼ to ij. in pill with glycerine of tragacanth; pilula podophyllin, gr. ¼; sanguinarin, gr. ¼ to 1 in pill with mucilage of tragacanth; sodæ sulphas effervescens ʒj.

Bites and Stings.

Locally:—

Alcohol; liquor ammoniæ; tinct. arnicæ; chloroform; solution of cocaine; onion juice; bicarbonate of soda; thymol ointment, gr. xx. to ʒj.

Chilblains.

Locally:—

Ointment of Boric Acid.
Ointment of Iodine.
Liniment of Belladonna.
Ung. Glyc. Subacet. Dil.

Digitated stockings and bathing in very hot water night and morning.

Constipation.

Aloin, gr. $\frac{1}{4}$ to 1.
Belladonna Extract, gr. $\frac{1}{4}$ to $\frac{1}{2}$.
Cascara Sagrada, Liquid Extract, ♏xx. or more (various elixirs and capsules).
Podophyllin Resin, gr. $\frac{1}{4}$.

℞ Ext. Elaterii, gr. ij.
Pulv. Capsici, gr. vj.
Calomelanos, gr. xij.
Ext. Gentianæ, ʒss.
Sacchari fæcis quantum sufficiat ut fiant pilulas duodecim, sit dosis j.

℞ Hyd. Subchl., gr. iij.
Pulv. Jalapæ Co., gr. x.

Fiat pulv., statim sumendus. A smart purgative useful at the outset of febrile attacks.

℞ Magnesiæ Sulphat., ℥ij.
Sodæ Sulphat., ℥ij.
Acid. Sulph. dil., ʒj.
Tinct. Card. Co., ʒij.
Aq. Menth. Pip. ad ℥vj.

Cochleare amplum ex aquâ calida donec alvi solutionem plenam.

Coughs.

If hard—depressant expectorants, with or without sedatives.

If loose—stimulant expectorants, with or without sedatives.

If simply frequent and irritable without expectoration—sedatives.

Depressant expectorants: ipecacuanha, apomorphia, antimony, alkalies, salines.

Stimulant expectorants: carbonate of ammonia, senega, squills, acids and astringents.

Sedatives: bromide, belladonna, opium and morphia, ether, chloroform, gelsemium, chloral, croton chloral, cannabis indica, hyoscyamus, alum.

Cubebs, copaiba, balsam of tolu and Peru, gum ammoniacum and compound tincture of benzoin are used to diminish the quantity of secretion.

Inhalations and sprays of astringents, sedatives, expectorants and antiseptics are also valuable:—benzoin, eucalyptus, terebene, conium, ipecacuanha and the like.

Fevers.

Large airy chamber at top of house; a good nurse; large fire; uniform temperature of about 60° F. day and night; fresh air, the patient being kept from draughts; but little furniture, and that such as can be cleaned; quietude; prevention of bed-sores. Sponging the skin with tepid or cold water. The wet pack. Intestinal irrigations of iced water. Quinine in large doses. Antipyrin, gr. x. or more. Antifibrin, gr. iv. or more. Kairin, gr. x. Inunctions of fat or vaseline all over the body, to relieve restlessness, promote sleep, and lower temperature.

Heart Disease.

Powdered Adonis Vernalis, gr. iij. to vj.
Infusion, 1 in 40, ʒiv.
Adonidin, a glucoside, gr. $\frac{1}{4}$ to $\frac{1}{2}$ daily.
Caffeina, $\frac{1}{2}$ to 5 grains.
Digitalis Tincture, ♏v. to x.
Infusion, ʒss. to ʒij.
Sulphate of Sparteine, gr. $\frac{1}{2}$ to 4.
Tincture of Convallaria, ♏x.
Tincture of Strophanthus, ♏ij. to v.

Each drug should be prescribed alone so as to estimate its effects.

Incontinence of Urine.

Circumcision if the foreskin is tight or long; if there is phimosis or adhesion of prepuce to glans penis. Incision of narrow meatus. Ligature or cauterisation of vascular polyp. Treatment of thread-worms, gastro-intestinal irritation, constipa-

tion, lithiasis and calculus. Rectal polypi must be removed. Fissures and sores about anus must be healed. Sounding the bladder. Dilating the urethra. Sponging the vulvæ with weak solution of carbolic acid and painting with strong solution of cocaine (gr. xx. to ʒj.). Belladonna tincture in increasing doses, with or without iron or strychnia.

℞ Tinct. Belladonnæ, ♏x., in syrup and water, t.d.s.

℞ Tinct. Ferri Perchl., ♏v.
Tinct. Nucis Vom., ♏v.
Syr. Aurantii, ♏xx.
Aq. ad ʒij. t.d.s.

Blisters to back of sacrum or back of neck.

Sleeping on the side with shoulders lowered, by wearing a bandage enclosing some hard body which rests on sacrum and by tilting the bed from below.

Itching—Pruritus.

Any alkaline solution: ʒj. of liquor potassæ, of carbonate of potash, or cyanide of potassium to Oj. of water, sponged on to the itching part. A one or two per cent. solution of carbolic acid or a drachm of liquor carbonis detergens to one or two ounces of water. Liquor plumbi. Unguentum glycerini plumbi subacetatis. Nitrate of silver ten grains to the ounce. Any mercurial ointment. A lotion or ointment of cocaine ten or twenty grains to the ounce.

Prolapsus Ani.

Usually constipation or diarrhœa attends this condition, and these must first be overcome by attending to the diet and giving appropriate medicines. A solution of alum or tannin, ten grains to the ounce of water, tends to constringe the mucous membrane and vessels. A flannel binder to the belly. Strychnia and iron internally. The prolapse should be reduced with an oiled piece of lint placed over it and the finger is then inserted into the orifice of the prolapse and pressure upwards employed. A jug of cold water should be poured onto the prolapse. The rational treatment of prolapse is to unload the portal vessels by saline purges and to tone up the mucous membrane by iron and strychnia. The child should lie on its right side whilst passing the motion and the

nurse should prevent the prolapse by supporting the anus by means of the thumb and finger of her hand. It is difficult to prevent a prolapse or to replace it if the child screams. Any fissure or ulcer must be healed.

Pyrosis.

Bismuth in any form ; also pepsin. Any dilute acid before meals, with or without strychnia. One drop of liquor arsenicalis is sometimes very useful, given immediately before the pyrosis is expected.

Sleeplessness.

Sulphonal, fifteen grains, as tabloids taken with water. Bromides, with or without hyoscyamus, cannabis indica, belladonna and chloral.

℞ Chloral Hydratis, gr. xv.
Potassii Bromidi, gr. xx.
Tinct. Cannabis Ind., ♏v.
Tinct. Hyoscyami, ♏v.
Syr. Aurantii, ʒj.
Aq. ad ʒjss. Statim sumendus.

Change of air and scene.

Ice-bag to head. Warm or mud bath. Sponging with tepid water in fevers.

Butyl-chloral, fifteen grains in glycerine and water.

Lupulin, two to five grains in a pill with glycerine and spirit.

Paraldehyde, 30 to 60 minims in diluted syrup or almond mixture.

Urethane, 15 to 60 grains, in tabloids.

Methylal, 15 to 30 minims in aqueous mixture.

Strychnina—liquor hydrochloratis, a few minims.

Amylene hydrate in capsules containing ten minims.

Thread Worms.

Enemata made of one pint of tepid water and any of the following substances:—Thirty grains of salicylate of soda; one teaspoonful of common salt ; one teaspoonful of sulphate of iron ; thirty grains of Castile soap ; one teaspoonful of alum.

If there be much distress—cold compresses, hot starch poultices, enema of opium, ♏v. and starch, ʒj. A little mercurial ointment will relieve pruritus ani; or a lotion of belladonna tincture, ʒj., prussic acid, ʒss, aquæ, ʒij.; or an ointment of cocaine 1 part, bismuth trisnitrate 2 parts and lanoline 20 parts.

Rhubarb, santonin, or sulphate of soda may be used internally. Any purgative is useful. Many astringents, such as kino, red gum, catechu, rhatany, are used as injections.

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