

is given. In some instances the local weakness may be due to an injury bruising or lacerating the vessel and injuring its internal coat. When an artery is wounded and when the wound in the skin and superficial structures heals, the blood may escape into the tissues. In this case it displaces the tissues and by its pressure causes them to condense and form the sac-wall. The coats of the vessels, more especially when they are diseased, may be torn from a severe strain, and the blood will then escape into the condensed tissues forming the sac-wall. When one or more of the vessel coats form the sac there results what is called a *true aneurism*; in those instances in which the sac-wall is formed by the condensed tissues around we have a *primary false aneurism*; when a true aneurism bursts and the blood escapes into the tissues around it, as sometimes occurs in deep-seated aneurisms, giving rise to secondary localized accumulation, the term *secondary false aneurism* is used. In both varieties of false aneurism the swelling is more diffuse and the pulsation as a rule is less marked than in the true aneurism.

The blood in an aneurism is at first in a fluid state, and at each beat of the heart a certain amount passes into the sac, causing its expansion. In all aneurisms there is a tendency to coagulation of the blood, and a blood-clot is deposited in a laminar form on the inner surface of the aneurismal sac. In some instances this laminar coagulation by constant additions gradually fills the aneurismal cavity. The pulsation in the sac then ceases; contraction of the sac and its contents gradually takes place; the aneurism is cured. On the other hand, if the blood within the sac remains fluid, the aneurism will gradually increase in size; the tissues over the aneurism and the sac-wall will become thinned, and at last give way; and death occurs from hæmorrhage.

Treatment of true aneurism.

In the treatment of true aneurism the great principle is to encourage coagulation in the aneurismal sac. This can be done by lessening the force of the circulation generally or locally. The general force of the circulation can be lessened by low diet, rest in bed, avoidance of all causes of vascular excitement, and by the administration of large doses of iodide of potassium. The force of the circulation can be decreased locally and temporarily by the application of a ligature to the artery between the aneurism and the heart or by the application of pressure upon the main vessel at a convenient point between the aneurism and the heart. The general treatment is available in all cases. The local treatment by operation or by compression is only available in those instances in which the aneurism is so situated that the blood-vessel can be compressed or ligatured, as in aneurisms of the head and neck or of the extremities. In certain aneurisms in the lower part of the neck and upper part of the thorax, in which a ligature cannot be applied between the aneurism and the heart, the blood-flow through the aneurismal sac has been diminished by the application of a ligature to one or more of the main vessels on the distal side of the aneurism. The blood-supply to the parts beyond the aneurism being thus cut off, the immediate effect is increased pressure on the aneurismal sac; but, since the parts accommodate themselves to altered circumstances, as the collateral blood-vessels increase in size, becoming the main vessels of supply to the parts beyond, the original channel becomes of secondary importance, the result being a diminution in the size of the main vessel and diminished blood in the sac, encouraging coagulation and contraction of the aneurismal sac. Practically the same effect has sometimes been obtained in a permanent way, as in cases of rapidly increasing aneurism of the subclavian artery in the root of the neck by amputation of the upper extremity at the shoulder joint. And within the last few years, in popliteal aneurism, the same thing has been done temporarily by the application of an elastic bandage to the limb from the foot upwards to the popliteal space, emptying the blood-vessels below the knee, and in this way cutting off the blood-supply temporarily. The application of the elastic bandage is continued up the thigh, care being taken not to make firm pressure with the bandage as it passes over the aneurism behind the knee joint, so that the sac may not be emptied of blood. If the sac were emptied, the object in view would be defeated, because there would be no blood in the sac to coagulate. The continuation of the bandage in the thigh above the aneurism is practically a compressing agent applied to the artery on the proximal side of the aneurism. The rationale of this treatment of popliteal aneurism, due to Dr Walter Reid of the British navy, may, if this explanation is correct, be said to owe its success to the fact that in it we combine the two great principles which check the blood-pressure locally, *i. e.*, a cutting off of the blood-supply beyond the aneurismal sac and compression on the main vessel on the proximal side. It is to be noted that all these different means of checking the blood-pressure within the aneurismal sac are temporary in their action. The temporary arrest by compression, the equally temporary arrest by the application of a ligature, in the latter case the collateral anastomosing circulation taking the place of that of the main trunk which has been ligatured, start the process of coagulation within the sac, and, the process being once started, complete consolidation gradually takes place. Although these methods of treatment are principally of value in true aneurism, they are also to a certain extent useful in secondary

false aneurism. In primary false aneurisms, on the other hand, we have to deal with a wounded vessel in which the blood, instead of being poured out externally, is poured into the tissues, and is practically a (chronic) bleeding point; the principle of treatment is to open the sac, turn out the clots, and ligature the artery above and below the bleeding point.

The veins are liable to inflammation (*phlebitis*). When this occurs the blood in the vein is liable to coagulation, forming a clot or thrombus, which, if displaced from its original position, either makes its way as an embolus towards the heart and is there arrested, or passes through the cavities of the heart into the lungs, there sticking and giving rise to lung symptoms. If the thrombus is formed in the hæmorrhoidal plexus, it passes as an embolus by the portal system into the liver. If it is formed in the left side of the heart, it may pass into the large vessels at the root of the neck and reach the brain, giving rise to symptoms of brain disease. The thrombus may be formed apart from inflammation of the vein wall in consequence of diseased states of the blood, as in gout and rheumatism, or it may form in consequence of stagnation of the blood-current due to slowing of the circulation in various wasting diseases. When a thrombus forms, absolute rest in the recumbent posture is to be strictly enjoined; the great danger is embolism or the displacement of the clot from its original position. Hot fomentations in the early stages and belladonna ointment when the condition becomes sub-acute are the best local applications. The desire is to promote absorption of the clot. The veins in the lower extremity and in the hæmorrhoidal and spermatic plexus are liable to dilatation. The condition is termed *varic*. The veins dilate with tortuosity; the valves become incompetent; and the condition is apt to spread. In the lower extremity the primary cause may be an injury or some obstruction at a higher point. General laxity of the tissues predisposes to the condition; occupations which necessitate much standing and alternation of heat and cold also act as predisposing causes. The treatment consists in giving the dilated vessel support by means of an elastic bandage or stocking. When the condition is local and gives discomfort, the vessel may be ligatured at various points so as to cause its obliteration. This operation should not be undertaken rashly, and should only be performed if the case is an aggravated one, since it is by no means devoid of risk. In the hæmorrhoidal plexus the disease is termed *internal hæmorrhoids* or *piles*; many operations are performed for this condition, but in the great majority of cases the careful use of purgatives and the administration of cold water injections into the rectum will relieve the condition. The dilated veins often ulcerate and give rise to bleeding piles; here an operation is often called for, because the persistent loss of even small quantities of blood is apt to result in chronic anemia. The enlargement of the spermatic plexus is termed *varicocele*, and almost always occurs on the left side. The use of a suspensory bandage and cold bathing should first be tried; if the disease persists, it is often associated with mental depression, and an operation—ligature at several points of the dilated vessel—should be performed. The disease may be associated with atrophy of the testicle on the same side, and this liability aggravates the mental condition and encourages the surgeon to operate. Inflammation of the lymphatic vessels in the lower limbs is often associated with inflammation of the veins in the female after delivery, giving rise to the various forms of *white leg*. Acute inflammation of the lymphatic vessels and glands is also associated with poisoned wounds, and has already been alluded to in connexion with injuries. The use of hot fomentations and careful elastic pressure with rest are prescribed for treatment.

2. Diseases of Bone.

Attention has already been directed to one form of injury to a bone, *viz.*, fracture. A word may now be said about inflammation of a bone and its results. As a typical instance we will take a long bone, consisting of a shaft and two extremities. The walls of the shaft consist of dense bone, the extremities of cancellated tissue. The shaft of the bone is hollow, and filled with medullary tissue. In the fully developed bone the extremities alone are tipped with cartilage; in the extremities of the bones of a growing person there are also layers, termed the *epiphyseal cartilages*. The bone is surrounded by a fibrous membrane termed the *periosteum*. This membrane is richly supplied with blood-vessels, which ramify through it and pass, along with lymphatic vessels and nerves, from it into the Haversian canals in the dense bone forming the shaft. The deeper layers of the periosteum consist of osteoblastic cells, which also line the Haversian canals. In the undeveloped condition these cell elements take an active part in the growth of the bone as regards its breadth, the epiphyseal cartilages taking an active part in its growth as regards its length. The medullary tissue in the cavity of the bone is supplied by the nutrient artery; the cancellated tissue forming the extremities receives its blood-supply partly from the nutrient artery and partly from vessels passing directly from the periosteum. When a bone is injured—as happens, for example, in a severe bruise—the blood-vessels in the periosteum and in the Haversian canals become congested, effusion of blood

sanguinis and migration of the white blood corpuscles take place, and a severe gnawing pain is felt at the seat of the bruise. The pain is severe because the effusion cannot escape. It collects under the periosteum and in the Haversian canals. The cell elements in these situations are irritated, and cell proliferation takes place. The periosteum becomes thickened, and if the tension continues suppuration may occur between the periosteum and the bone. The periosteum is raised from the bone; the blood-vessels passing into the Haversian canals are obliterated or torn across; and the outer layers of the hard dense bone, their sources of nutriment being cut off, die. The extent of the necrosed tissue will depend upon the extent of the suppurating area; if the suppurating area includes the nutrient artery within its range, nutriment being then cut off from the medullary tissue from which in part the deeper layers of the shaft of the bone are supplied with blood, death of the whole thickness of the shaft of the bone may occur. As already stated, the most acute forms of suppurative periostitis and suppurative osteomyelitis are infective diseases, the suppuration in them being due to the presence of a micrococcus. If after an injury the primary inflammation is relieved by fomentations, leeching, or incisions, suppuration may be prevented; or even if, after suppuration has occurred, free incisions are made to allow the pus to escape, the periosteum may assume its normal position, and the area of necrosis be limited or may be prevented altogether. After a portion of the shaft of the bone dies, the necrosed area is gradually absorbed; but, if the area is of considerable size, and more particularly if sepsis occurs, the dead part is gradually separated from the living, and after a time it becomes loose, and as a rule has to be removed by operation. If the inflammation, acute in the first instance, becomes sub-acute, or if it is sub-acute from the first, then, instead of suppuration, the effusion under the periosteum coagulates, whereupon lymph is formed, the proliferating osteoblastic cells in the lymph take up their normal function, and new bone is made. This mass of new bone is termed a *node*. In the Haversian canals the osteoblasts there forming bone will render the bone tissue more dense and ivory-like in consistence, to which the term *sclerosis* is applied. In some cases the osteoblastic cells in the Haversian canals, instead of forming bone, feed upon the original bony tissue which constitutes the walls of the canals. The Haversian canals becoming enlarged, the result is a lessening of the amount of inorganic matter in the area affected, and a cancellation of the hard bone takes place. This condition is called *rarefying osteitis*. The rarefaction of the dense bone may persist, or the process may stop, the osteoblasts again forming bone and the rarefied area becoming sclerosed. In the cancellated tissue in the extremities of the long bones, and in that which forms the mass of the short bones, such as the vertebrae, the tarsal and the carpal bones, the inorganic matter compared with the hard bone is relatively in smaller amount than the organic matter filling the cancella. Here as a result of injury the thin lamellæ of bone may be cut off from their blood-supply, and death take place. If the process is acute, an area of cancellated tissue will die, and be separated from the surrounding living tissue as in the hard bone. In consequence, however, of the quantity of organic matter, death may take place in a molecular form, more nearly allied to the process of ulceration in the soft parts. This condition is known as *caries*. If the inflammatory process in cancellated tissue is sub-acute, instead of a molecular death, sclerosis of the cancellated tissue occurs. When the cancellated tissue is the seat of inflammation, in consequence of its close connexion and intimate anatomical relations with the articular cartilages, they in their turn become implicated, and we have then to deal with disease of the joint. In all cases in which incisions are made to relieve tension under the periosteum, or in which portions of bone are removed to relieve tension in the shaft or in the medullary cavity of a bone, or in which incisions are made to check the progress of inflammatory action in the cancellated tissue, strict antiseptic precautions must be taken to prevent sepsis occurring in the wound.

3. Diseases of Joints.

A joint is a complicated organ, and its integrity depends upon a healthy condition of the bones which form it, of the articular cartilages which cover the ends of the bones, and of the synovial membrane which supplies the synovial fluid that lubricates the joint. These different structures are closely associated anatomically and physiologically, and disease beginning in any one of them will assuredly, unless checked, gradually extend to the others. The cartilage covering the ends of the bones receives its blood-supply mainly from the bone, and is also to a certain extent supplied at its edges by the synovial membrane. The cartilage being in itself non-vascular, disease does not commence in it; the majority of joint diseases commence either in the synovial membrane or in the bone; as a general rule they begin with some slight injury of the joint. These injuries consist of strains or twists (of the joint) on the one hand and jarring or contusion on the other. In the latter case the elastic cartilage lessens the force of the contusion.

When a joint is strained, the ligaments binding the bones to-

gether are stretched and the synovial membrane becomes inflamed. Consequently effusion takes place into the joint, which becomes swollen and painful on pressure. Any movement of it is painful, and all the muscles around it are rigid. In a healthy person appropriate treatment—rest, hot fomentations, and gentle elastic pressure—will cause the fluid within the joint to be gradually absorbed, after which the joint can be restored to its normal condition. When the inflammation becomes sub-acute the pain disappears, and unless the joint is kept quiet by appropriate splints the condition is very apt to become chronic; that is, the joint becomes swollen and the movements are restricted. This condition is most persistent, and prolonged rest, along with counter-irritation by blistering or by the application of tincture of iodine, is necessary before the effusion subsides. The joint may remain weak for the rest of the patient's life. Fibrous adhesions may form and prevent free movement. A joint in such a condition is always liable on the slightest injury to have a return of the effusion in an acute or sub-acute form. These are the chief consequences of a strain in a healthy person. In a weakly person the primary strain may entail a very different result. The synovial membrane may undergo gelatinous or pulpy degeneration, and, although it is improbable that this condition is associated with the tubercular diathesis in all cases, there can be no doubt that in very many the degeneration of the synovial membrane is tubercular in character. The tubercle bacillus has been found in the thickened membrane. A joint in this condition swells; the enlargement, although it may be due in part to effusion into the cavity of the joint, is mainly caused by the thickening of the synovial membrane, which has a peculiar doughy semi-elastic feeling. The movements of the joint are restricted, though little pain is complained of. If it is an upper limb the patient will not use it, if a lower limb he will walk with a distinct limp. The disease is a chronic one, and the joint may remain in this condition for months. Rest, elastic pressure, and blistering may check the progress of the disease, but as a rule, sooner or later, and very often as the result of some slight injury, a change takes place. On the one hand, the effusion within the joint, instead of being serous, becomes sero-purulent and even purulent, owing to the formation of pus within it. If the joint is an important one, inflammatory fever is set up; the joint becomes intensely painful on the slightest movement, and unless incisions are made to allow the pus to escape it passes gradually into a state of complete disorganization. The cartilage softens and breaks down, so that gradually the cancellated bone underneath is exposed. A similar change takes place in the opposing cartilage. It is destroyed in its turn and the ligaments binding the bones together are softened and lose their elasticity, so that the joint can be moved in abnormal directions. A grating sensation can be felt when the cancellated bony surfaces are rubbed together. Along with these changes within the joint, foci of inflammation form in the soft tissues around it. These inflammatory areas suppurate; the abscesses burst into the joint; the skin over them gives way; and communication is established between the external air and the cavity of the joint. Through this channel the causes of putrefaction reach the cavity, and complete disorganization of the part accompanied by sepsis occurs. Should the joint be an important one, a condition termed *hectic* is set up. If the discharge is allowed to continue, a gradual wasting takes place, which sooner or later ends in the death of the individual, unless the surgeon either relieves the tension by free incisions, or excises the joint, or amputates the limb. After disorganization has occurred, if the inflammatory process ceases, ankylosis of the joint may result. But, if the joint is freely drained and kept at rest, the inflammation will subside, and the granulation tissue on the two opposing surfaces will unite and a fibrous formation take place. The process may stop there, or the fibrous tissue may be gradually transformed into bone. Osseous union has taken place between the bones forming the joint. In many cases this is what the surgeon aims at, and it is of great importance to keep it constantly in view and to place the joint in such a position that, if ankylosis does occur, the limb may be as useful as possible. This result is only attained after prolonged treatment, and, if the patient's strength is unequal to it, it will be necessary to excise the affected joint or to amputate the limb. Suppuration sometimes occurs within a joint without any previous pulpy degeneration of the synovial membrane, either as the result of a wound or from septic inflammation secondary to pyæmia, or in consequence of a very acute simple synovitis resulting from excessive tension within the joint. When the synovial membrane is affected with pulpy degeneration the vitality of the cartilage at its edges, where it joins the synovial membrane, may be interfered with: the thickened synovial membrane, by encroaching on the articular cartilage, gradually by pressure alters the nutrition of the cartilage so that it disintegrates and breaks down, and when it is destroyed disorganization of the joint ensues, as already described. Should the disease assume this form, if care is taken, and if the joint is kept quiet, suppuration within it need not necessarily take place. The inflammation may assume a sub-acute type and fibrous ankylosis occur.

When a joint has been severely contused, separation of the cartilage from the bone occurs; effusion then takes place between the cartilage and the bone; the cartilage is cut off from its nutrient supply; and, unless the joint is kept at complete rest, unless the effusion is absorbed, the cartilage will sooner or later become necrosed. The necrosed cartilage will give way; the bone beneath will be exposed; and, if the irritation is kept up, effusion, at first serous but soon becoming purulent in consequence of the tension within the joint, will take place. Changes follow in the opposing cartilage, which has been itself bruised by the primary jar, and perhaps even separated from the bone beneath. It will in its turn necrose, and the bone will be exposed, suppuration taking place within the joint. The synovial membrane will become diseased, the ligaments softened, and the evil sequence of events already described will ensue. A joint affected in this way is easily recognized from one in which the synovial membrane is primarily affected by the absence of swelling and by the intense pain. In the early stages complete rest should be obtained by affixing a weight to the affected limb. This, by setting up between the opposed and injured cartilaginous surfaces a condition of negative pressure, will tend to check the disease. But if this plan of treatment does not soon cause a subsidence of the pain, actual cautery must at once be resorted to. Contusion in which the cancellated bone is injured at some distance from the cartilage is most commonly met with in young people, in whom the extremities of the bones are not fully developed. In them the epiphyseal cartilages are richly supplied with blood for the performance of their physiological function, the formation of bone, and a comparatively slight injury may cause inflammation to be set up in the bone immediately in contact with the epiphyseal cartilage. As in the synovial membrane when it is affected with pulpy degeneration, this disease may be occasionally non-tubercular in character; but in the majority of cases, more especially when the primary injury is very slight, the disease assumes the tubercular type and tubercle is deposited. In such cases the symptoms are often very insidious; the young patient complains of some slight uneasiness, or the first thing to be noticed is a limp in walking when a lower limb is affected. In the case of an upper limb the patient will avoid moving the affected joint. As there is no external swelling, the disease may be overlooked in its early stages; but, if it is suspected, and if the affected limb is kept at rest, the inflammation will subside and recovery ensue. On the other hand, if the patient is allowed to use the limb, even in an imperfect way, the tubercular area may extend and the articular cartilage become affected. The articular cartilage does not in that case receive its proper nourishment; it disintegrates, breaks down, and the disease attacks the joint. Into this last tubercular matter escapes and suppuration occurs, resulting sooner or later in disorganization of the joint.

In recent years a useful limb has often been saved by excision of the affected joint. In the early stages the disease may subside under appropriate local treatment, such as counter-irritation, rest, pressure, assisted by constitutional treatment, such as tonics, fresh air, and careful dieting. By these means an operation may be avoided, and in applying such treatment it must be remembered that, while the disease itself may subside, the joint as an organ may be irretrievably damaged: it may become ankylosed. If ankylosis occurs in a flexed position of the hip or knee joints, the limb will be useless for progression; and an operation will be necessary in order to straighten it. In the ankle joint, if ankylosis occurs with the foot in an extended position, the patient will not be able to put his heel to the ground, and an operation will be necessary to bring the foot at right angles to the leg. Do not interfere with an ankylosed joint in the lower limb if it is in good position. If the shoulder joint becomes ankylosed after disease, the sternoclavicular and acromio-clavicular joints take up to a great extent the function of the ankylosed shoulder. In the elbow, in whatever position the joint becomes ankylosed, the arm loses much of its usefulness and excision of the joint is performed in order to get a movable elbow. In the wrist it may be necessary to operate for ankylosis; but as a rule, if the fingers are mobile, the ankylosed wrist does not interfere to any great extent with the usefulness of the hand.

A. Venereal Diseases.

Three distinct affections are included under this term—gonorrhœa, chancre, and syphilis. At one time these were regarded as different forms of the same disease; and, though gonorrhœa is now generally held to be quite distinct from the other two, there are not wanting eminent authorities, including Mr Jonathan Hutchinson, who are inclined to look upon chancre and syphilis as essentially one and the same disease. The present writer believes that gonorrhœa, chancre, and syphilis are three distinct diseases, due to separate causes, which have nothing in common except their habitat. The cause in each case is a specific virus, probably a micro-organism. In the case of gonorrhœa the virus attacks mucous membranes, especially that of the urethra; in chancre mucous membranes and the skin are affected; in syphilis the whole system comes under the influence of the poison. Gonorrhœa

and chancre correspond to the process of septic intoxication. The organisms on implantation set up a local disturbance, and the products of this fermentative process pass into the system and give rise to constitutional effects; but the organisms themselves do not pass into the system generally. In syphilis, on the other hand, there is a true infective process: the organisms pass into the general circulation and live and multiply wherever they find a suitable nidus. The joint affection commonly called "gonorrhœal rheumatism," which sometimes follows gonorrhœa, is in all probability an infective condition. If this is true, then in these rare cases gonorrhœa is infective. The chancreoid poison may pass into the lymphatics and cause inflammation of the lymphatic glands in the groin, giving rise to *chancreoid tubercle*. These clinical facts are undoubtedly opposed to any generalization such as that laid down above, and it is right to note them; but the general comparison between gonorrhœa and chancre as non-infective and syphilis as distinctly infective in its character holds good in the great majority of cases. A further study of these quasi-infective varieties of gonorrhœa and chancre must undoubtedly throw light upon the physiological classification of pathogenic organisms. These three affections are generally acquired as the result of impure sexual intercourse; but there are other methods of contagion, as, for example, when the accoucheur is poisoned whilst delivering a syphilitic woman, the surgeon when operating on a syphilitic patient. An individual may be attacked by any one or any two of the three, or by all of them at once, as the result of one and the same connexion; but they do not show themselves at the same time; in other words, they have different stages of incubation. In gonorrhœa the disease appears very rapidly, so also in chancre, the first symptoms commencing as a rule three or four days after inoculation. It is very different, however, with syphilis. Here the period of incubation is one rather of weeks, the average length being twenty-eight days, though it may vary from one week to eight. The length of the period of incubation, therefore, is the great primary diagnostic in the case of syphilis.

Syphilis is an infective fever, and its life history may be best considered by comparing it with vaccinia. A child is vaccinated on the arm with vaccine lymph. For the first two or three days nothing is observed; but on the fourth day redness appears, and by the eighth day a characteristic vaccine vesicle is formed, which bursts and frees a discharge, which dries and forms a scab. If on the eighth day the clear lymph in the vesicle is introduced at another point in the child's skin, no characteristic local effect follows. The system is protected by the previous inoculation; this protection will last for some years, and in certain cases for the rest of the patient's life. We have here, then, exposure to a poison, its introduction locally, a period of incubation, a characteristic local appearance at the seat of inoculation, a change in the constitution of the individual, and protection from another attack for a variable period. So with syphilis. The syphilitic poison is introduced at the seat of an accidental abrasion either on the genital organs or on any part of the surface of the body. The poison lies quiescent for a variable period. The average period is four weeks. A characteristic cartilaginous hardness appears at the seat of inoculation. If this is irritated in any way, an ulceration takes place; but ulceration is an accident, not an essential. From the primary seat the system generally is infected. The virus is multiplied locally and, passing along the lymphatic vessels, attacks the nearest chain of lymphatic glands. If the original sore is in the genital organs, the glands in the groin are first attacked; if in the hand, the gland above the inner condyle of the humerus; if on the lip, the gland in front of the angle of the jaw. The affected glands are indurated and painless; they may become inflamed, just as the primary lesion may ulcerate; but the inflammation is an accident, not an essential. From the primary glands the mischief will affect the whole glandular system. The body generally is so altered that various skin eruptions, often symmetrical, break out. Any irritation of the mucous membrane is followed by superficial necrosations, and in the later stages of the disease skin eruptions, pustular and tubercular in type, appear, and in weakly people in severe cases, or in cases that have not been properly treated by the surgeon, syphilitic deposits termed *gummata* are formed. These, if irritated, break down and give rise to deep-seated ulcerations. Gummata may attack the different organs in the body; the muscles, liver, and brain are the favourite sites. Their presence interferes with the functions of the organs, and, if the organ affected is one functionally important in the economy, may cause death. The individual is as a general rule protected against a second attack, although there have been rare cases recorded in which individuals have been attacked a second time.

Syphilis is treated by many surgeons by giving careful attention to the general health, to diet and regimen and tonics, by placing the patient in the most favourable hygienic circumstances, in the belief that it runs a natural course and has a tendency to natural cure. Special symptoms are treated as they arise. Other surgeons administer small doses of mercury, in the form of grey powder, iodide of mercury, or corrosive sublimate. If the physiological

effects of mercury are observed—tenderness of the gums and a metallic taste in the mouth—this treatment is desisted from and iodide of potassium is administered, mercury being given again when its physiological symptoms have disappeared. Ointment of mercury or mercurial ointment, or mercury with lanoline, is applied to the primary lesion and rubbed in over the enlarged glands. This is continued for six months or a year. In the later stages of the complaint iodide of potassium is the main remedy used. There are therefore two distinct methods of treating syphilis,—the non-mercurial and the mercurial. Both methods have been extensively tried by the present writer, and he believes that the mercurial is infinitely preferable to the non-mercurial method. Recent investigations point to the value of corrosive sublimate as a gericide, and in all probability the good results which follow saturation of the system with mercury are to be explained in this way. It is said by the non-mercurialists that the administration of mercury masks the symptoms. There can be no doubt that the symptoms often appear after the mercury is stopped, but in a modified form, and there is no evidence that the mercurial treatment prolongs the disease. Syphilis has a tendency to natural cure, like all the continued fevers, and along with the administration of mercury careful hygienic treatment must receive particular attention, and often in weakly unhealthy people a long sea voyage is of great value. Any means which causes a free action of the skin, as, for instance, by periodic visits to thermal baths, is of great assistance in eliminating the poison.

Syphilis as commonly met with nowadays is not of so severe a type as it formerly was. One reason often given for this is that mercury was formerly always pushed until its full physiological effects were observed, and that the lowering of the patient's constitution by this severe treatment aggravated the primary complaint. There may be some truth in this explanation; but the principal reason in all probability is that the syphilitic organism does not now find so suitable a nidus or soil for its growth and development as it once did. Syphilis in the United Kingdom at the present moment is in the stage of an epidemic in its decline. This may be looked on as a startling statement; but it is true of syphilis as of all infective diseases. A time must come when the soil is practically worn out, when it becomes so poor that the organism grows only in a stunted form, producing a mild disease, till in time it ceases to grow altogether. It is not asserted that it will necessarily die out, because after lying fallow for a time the soil may recover its power and the disease be revived in a more virulent form, analogous to the luxuriant crop which follows after a period of fallow. Syphilis can be conveyed by the discharge from any syphilitic lesion occurring within two years after the commencement of the complaint. It cannot be conveyed by the normal secretions of the syphilitic person except in the case of the semen, which, impregnating the ovum in the female, causes the fetus to be syphilitic. Syphilization of the fetus is followed by syphilization of the mother. The blood of a syphilitic person is infectious for two years after the commencement of the attack. Pure vaccine lymph cannot convey syphilis; if, however, it is mixed with blood it may convey it. No person who has had syphilis should marry until he has been entirely free from the complaint for two, or better still for three, years. If a person marries before this time pregnancy greatly increases the risk to the mother. If there is any suspicion of syphilis the mother should take mercury during the period of pregnancy. It is interesting to note how time has a modifying influence in a case of repeated pregnancies occurring in a syphilitic woman. At first there may be miscarriage in the early stage of pregnancy; after a time abortions in the later stage; there may then be a still-born child; then one born alive but syphilitic; then a child born apparently healthy but soon becoming syphilitic; and ultimately a healthy child is born and remains healthy, showing no evidence of syphilitic disease. The disease has worn itself out. The relation of apparently healthy people born of syphilitic parents to syphilis acquired during the course of their life may explain those remarkable cases of escape from syphilitic infection which constantly come under the observation of the surgeon.

5. Tumours.¹

As the result of a local irritation an acute inflammatory swelling may appear. If the irritant is of a severe type the result may be local death. An abscess may form; and, after the pus has escaped or has been evacuated, and after the original cause of the irritation has subsided, the swelling may disappear and the parts be restored to a condition nearly allied to the normal. If the irritant, however, is slight and its action prolonged, a chronic inflammatory swelling of the part may result. Although in many cases with appropriate treatment the induration disappears, in other cases it persists during the life of the individual. The indurated mass in its microscopic characters closely resembles the original anatomical characteristics of the part affected. When, for example, an organ like a gland is the seat of a chronic irritation a general increase in its size takes place. A hypertrophy or overgrowth has occurred, but as a rule

¹ Compare PATHOLOGY, vol. xviii. p. 367 sq.

the hypertrophied gland is only altered in size; it retains its general shape and functional activity. Occasionally the hypertrophic area is localized, and to a great extent separable from the original gland by a more or less distinct capsule. In the mammary gland, for example, a local hypertrophy may occur, the microscopic characters of which resemble imperfect gland tissue. Between this condition and an adenoid or glandular tumour of the mamma no distinct line of demarcation can be drawn, and the probability is that the adenomatous tumour of the mamma is caused by local irritation. It may be the immediate outcome of a misdirected or excessive functional activity. The great practical difference, however, between it and true hypertrophy is this, that it can only be removed by operation. The adenomatous tumour closely resembles in some of its microscopic characters one of the varieties of epithelioma, of which an increase in the columnar epithelium lining the acini in the gland is the main characteristic. This tumour is not a simple tumour like the true adenoma; it does not grow slowly; it is not encapsulated; the cellular elements in it not only invade the surrounding tissues but tend to pass into the lymphatic vessels and reach the lymphatic glands in the axilla, where they grow and form secondary tumours similar in microscopic characters to the original growth. From these secondary foci a further invasion may take place, and the cell elements may reach the blood-stream and be caught in the capillaries, forming there new growths, till the patient dies from the general implication of the whole system. This form of tumour has been termed a *malignant adenoma*. While it has originally the microscopic characters of a simple adenoma, if we look to its life history we have in it an excellent example of a malignant tumour. Microscopically it is a stepping-stone between the simple and the malignant type of tumour; clinically it is characteristically malignant. The mammary gland is composed of glandular tissue and fibrous tissue. A hyperplasia of the fibrous tissue may occur in consequence of an excessive irritation of the glandular tissue, or apparently a primary increase in the fibrous tissue may occur locally, giving rise to a simple fibrous tumour of the mamma, of which fully developed fibrous tissue is the microscopic characteristic. This overgrowth may become encapsulated and give rise to no symptoms except those referable to its gradual increase in size, and after the gland in which it lies has fulfilled its life history it may stop growing, degenerate, and decay. In the uterus, e.g., those fibrous tumours which occur after the time of child-bearing is past, after the uterus has fulfilled its destiny, cease to give any further trouble and are only inconvenient in consequence of their size. Fibrous tissue in the early stages of its development is largely composed of cell elements, and there are tumours, e.g., in connexion with the mamma, which have their prototype in the undeveloped or cellular stage of fibrous tissue. These tumours also are essentially malignant. They grow rapidly, and are richly supplied with thin-walled blood-vessels; the elements of the tumour pass directly into the blood-stream, and reach the capillaries, where they are arrested and where secondary growths like the original growth in their anatomical characteristics are formed, causing the death of the patient.

In what has just been said it will be seen that there is no distinct line of demarcation between the inflammatory swelling and the hypertrophy, between the hypertrophy and the tumour proper, between the simple and the malignant tumour. The local irritation can be traced in the case of the inflammatory swelling and the hypertrophy, and it is highly probable that both the simple and the malignant tumour are also due to local irritation. It must, however, be acknowledged that it cannot always be traced. If the malignant tumour is not due to local irritation, but to a general dyscrasia or peculiarity of the patient, the surgeon has slight grounds for recommending its removal. If, however, he believes that all tumours are evidences of local irritation, he is fully justified in recommending their early and complete removal—in the case of the malignant tumours before they have time to spread by the lymphatic or blood-stream to distant parts, in the case of simple tumours before they have assumed characteristics of malignancy, as these tumours sometimes do. The mammary gland has been taken as an example of an organ in which tumours frequently occur. The reason for this frequency, if we believe in local irritation as a cause of tumour-growth, is not far to seek: from the time of puberty to the time when it terminates its functional activity this gland is in a constant state of vascular unrest and functional change. Both forms of tumour are met with in all the organs and tissues of the body. Simple tumours are generally composed of fully developed tissue, similar to the tissue in which they lie, the simple fatty tumour occurring in connexion with fatty tissue, the simple fibrous tumour in connexion with fibrous tissue, the osseous tumour in connexion with bone. The malignant tumour, on the other hand, is generally formed of undeveloped tissue which has not yet fulfilled its destiny, which is not only misplaced in situation but in time. The cartilaginous tumour has its prototype in cartilage, for that which covers the ends of the long bones and enters into the formation of a joint is a fully developed tissue. The true prototype of the cartilaginous tumour is not, however, fully developed cartilage, but one or other of those forms of cartilage which, as regards their development