or opium would now enable me to save. If it be sought to study the effect of opium as a stimulant, it cannot be better seen than by watching its effects in the shock and collapse following extensive burns. I have to thank the help afforded by modern nursing developments for much wholesome change of opinion in these matters. It has only been since the introduction of trained women to the bedside, with their watchful intelligence and careful skill, that I have learned properly to deal with cases after operation. That intuitive faculty, amounting to what used to be mis-called an "instinct," and which is the special property of women, finds its best expression in the study and management of difficulties like those I speak of.

Of the treatment of the usually more persistent condition of vomiting, with its attendant exhaustion, much need not be added to the limited list of measures employed in the treatment of shock. Warmth, rectal stimulation, and the hypodermic syringe again find their use. If to these I add rubefaction, or occasionally limited blistering over the stomach, I have enumerated all the means I find most excellent. The host of drugs recommended to check vomiting are, in my experience, worse than useless; they are not only ineffectual, but they add seriously to the gastric disturbance. One measure, introduced of late, we are trying in the Richmond Hospital. I mean the use, for some hours after operation, of a mask charged with vinegar. We are not yet in a position to speak definitely about this treatment, but it seems to give promise of success in cases where chloroform has been the anæsthetic. The rationale of its action is simple; the chloroform which is exhaled by the lungs is decomposed during expiration into chlorine and formic acid. The chlorine, by its irritation of the trachea and larynx, is probably the cause of vomiting, and being taken up by the acetic acid, is rendered harmless. But so far as present experience carries us, the hypodermic use of morphine is the cardinal remedy for the species of vomiting of which I speak. It must be used intelligently, fully, and fearlessly, and will exercise its effects both as a stimulant and as a gastric sedative far beyond those of any other remedy.

If it be conceded that it is useless to introduce stimulant or aliment into the stomach of a patient suffering from shock, it will be granted that it is not only useless but improper when vomiting is present; and here a previously cleaned rectum serves its owner well. Stimulants associated with such nutriment as can be readily absorbed should be periodically introduced. It is generally found that vomiting any more than shock does not persist with a warm surface, and therefore the three remedies I have indicated should be employed in the same sequence as in shock; first, heat; second, rectal stimulation and nourishment; and third, morphine.

The distressing symptom of thirst is one which gives great trouble. There is nothing I have learned to discredit more thoroughly for the relief of thirst than ice. It increases thirst both directly and by the induction of vomiting. The emesis it produces is due to the quantity of water the sucking of ice insidiously introduces into the stomach. Nothing should be put into the stomach in these cases, so that ice is not only useless, but hurtful. Thirst is best relieved by frequent rinsing of the mouth with hot water, and by the occasional introduction of two or three ounces of warm water into the rectum.

In what I have said I have avoided speaking of details and methods; I have remembered that, although some of us are younger and less experienced than others, all of us in this room are educated in the factors of surgical science, and I have therefore tried to be suggestive rather than didactic, and to avoid details except in so far as they were necessary to the elucidation of principles.

If I may reduce to formulæ the matters I have referred to, I would put them thus:

1. That the tendency to prolong operations must be carefully guarded against, as it is a grave cause of danger.

2. That in the treatment of shock and vomiting following operation we get no help from the stomach, and must rely on the rectum as its substitute.

3. That heat, alcohol, and opiates are our best remedies; and that the latter are well borne, and must be intelligently used to their full effect.

4. That drugs of the class ordinarily used to check vomiting are of little or no use in the cases under consideration.

5. That ice does not relieve thirst, and does harm by introducing water into the stomach and so provoking vomiting.

THE BRADSHAW LECTURE ON INFECTIVE AND TUBERCULOUS OSTEITIS AS CAUSES OF ARTHRITIS IN CHILDHOOD, AND THE IMPORTANCE OF EARLY TREATMENT.

Delivered before the Royal College of Surgeons of England.

By N. C. MACNAMARA, F.R.C.S.,
Surgeon Westminster Hospital.

I PROPOSE in this lecture to consider how it is that the extremities of the long bones entering into the formation of various joints are peculiarly liable during childhood to become the breeding ground of certain forms of micro-organisms, and so to be affected with osteitis, and then to inquire by what means we can best dislodge such parasites before they have destroyed the tissues among which they may have taken root. It will be necessary to confine my remarks to a typical example of acute and of chronic inflammation of bone produced by two well-defined microbes, and to illustrate the subject by reference to disease of the knee; this joint, being one of the largest and most superficial articulations of the body, affords us a favourable opportunity for determining the nature of any morbid action taking place in the bones entering into its formation.

The condyles of the femur at each step we take have to bear the weight of the body, which in like manner is supported on the upper surface of the head of the tibia, so that these opposing portions of bone are constantly subjected to considerable pressure and to concussion. This pressure, in consequence of the comparatively soft condition of the osseous tissue in childhood, is largely distributed throughout the trabecular tissue contained within the extremities of the bones which enter into the formation of the joint. The trabecular network within the extremities of the long bones is also subjected to traction, especially at the point of union between ligaments and tendons with the bones. So intimate is this union that in cases of violence tendons not infrequently tear away portions of the cancellous tissue as well as the compact outer layers of the bone into which they are inserted. It follows, therefore, that the trabeculae contained in the extremities of these bones have to bear their share in the frequent wrenches and strains to which the joints of children are subjected; and it is within the meshes formed by the interlacing of these trabeculae that the red marrow of the bone is contained; red, because it is full of blood, and among the other functions which it has to perform is that of manufacturing the red blood corpuscles. Beyond this the trabeculae are lined with cells from which in childhood the growth of the epiphysis, and at the juxta-epiphysal line the increase in length of the shaft of the bone takes place, necessitating active and extremely complicated physiological changes in the organic matter through means of which growth is effected.

We may form some idea of the activity of the work going on within the bones entering into the formation of the knee-joint from its abundant supply of blood vessels; the four articular arteries, the azygos, and branches of the tibial and femoral vessels all send numerous offsets into the bones; in fact the condyles of the femur and head of the tibia are riddled with openings through which vessels pass into and leave the cancellous tissue. Within the bone the arteries break up into narrow vessels which open into a plexus of peculiarly wide venous capillaries, and these into veins which have to pass out of the bone through unyielding channels which perforate the dense external layers of the bone. The circulation of blood, therefore, through the thin-walled venous capillaries in the marrow of bone is much delayed, and it is in this sluggish stream of blood that the nucleated cells are converted into red blood corpuscles.

Within the cancellous tissue of the long bones we have therefore highly vascular delicate soft structures through which the circulation of blood is much impeded, and these tissues during childhood, as already explained, are peculiarly liable to contusion by external force. Beyond this the marrow contains numerous cells through means of which the growth and repair of the bone is effected. We are apt to overlook the important and extremely complex nature of the process of growth; it means a vast expenditure of physiological action, and an almost inconceivably complicated arrangement of the constituent elements of the organic matter engaged in the process. But the more complicated the machine, the less its stability, and consequently the greater the danger of its component parts being disarranged. And it is in organic matter which has been contused, or in which the constituent parts have otherwise been much disturbed, and its vitality thus lowered, that micro-organisms take root, and so we can comprehend why it is that the marrow of the cancellous tissue in the ends of the long bones during childhood are not infrequently the breeding ground of various forms of microbes.

The vulnerability of the tissues of young persons to the action of microbes is exemplified by the eruptive fevers from which they suffer; also by the susceptibility of European recruits to tropical influences on their arrival in India. As we advance in life the ends of the long bones become surrounded by layers of dense unyielding osseous tissue, which to a large extent preserves the soft structures contained within the cancellous tissue from injury; the process of growth has also been completed, and the tissues have become more stable; it follows therefore that acute infective or tuberculous osteitis seldom commences in the joints of persons who have passed the age of childhood.

It is hardly necessary to observe that the bones increase in length by the growth of osseous tissue at the juxta-epiphyseal line, and that at this line in the growing bone the trabecular network is composed of temporary, that is of brittle, bone in which the venous radicles pass up to the epiphyseal cartilage, and there form loops more like sinuses than ordinary veins. One or two arteries from the diaphysis pass through the cartilage into the epiphysis, but by far the greater part of the blood supply of the epiphysis is independent of that of the diaphysis; in fact, the shaft of one of the long bones may become necrosed and be removed, and yet the epiphysis may continue to live and grow. Muscular force is capable of causing the complete detachment of an epiphysis, and fractures not infrequently occur through this line. Short of such extensive injuries, ecchymosis and laceration of the fragile and rapidly growing structures at the juxta-epiphyseal line must be of common occurrence in childhood.

The circumference of the epiphyseal cartilage is prolonged into the deep layer of the periosteum of the diaphysis, and its cells produce the osteoblasts of that layer; the extremities, therefore, of the diaphysis in the growing bones of children are enclosed in a cup-like cavity of cartilage, and if acute inflammation should occur in the brittle tissues at the juxta-epiphyseal line, the products of the inflammatory action must find an exit either through the trabecular network of the extremity of the diaphysis into the medullary canal, or between the deep layer of the periosteum and the outer surface of the bone. In either case the blood supply of the diaphysis is cut off, the periosteum being stripped from the bone, and the pressure of the inflammatory products against the unyielding trabeculae and Haversian system prevents the circulation of blood through the shaft of the bone, and it consequently becomes necrosed; but the deep layer of the periosteum having been forced outwards with the surrounding vascular structures may continue to live and form a case of new bone around the necrosed diaphysis.

Professor Ollier, in the year 1881, published the results of some experiments he had made on the dead bodies of children which illustrate the point above referred to. He found that only slight force applied in certain directions was sufficient to injure, and often to lacerate the soft tissues at the juxta-epiphyseal line. If the force was increased the injured structures could without difficulty be squeezed outwards beneath the deep layer of the periosteum, but not into the external soft tissues or round the epiphysis. Ollier also

states that in the case of children who had died from tuberculosis or from septic poisoning the structures at the juxta-epiphyseal line were peculiarly friable. Without doubt a young and healthy bone, like that of a branch of a living tree, is a very different thing from the same part after death; but among our poor, neglected, anæmic, London-bred children the tissues are often, as regards their vitality, not far removed from dead structures. We can readily conceive that the organic matter which forms the bodies of these children is less capable of resisting the attacks of micro-organisms than those of more robust and well-cared-for beings. One seems to realise this difference when before the days of Listerian surgery one saw the swarms of ants and flies which attacked in a climate like that of Calcutta the wounds of persons whose vital powers were at a low ebb. And so with micro-organisms; their opportunity is in structures which have been contused or their vitality depressed by some other cause; it is in organic matter of this kind that microbes take root.

Bacteriologists teach us that micro-organisms of a dangerous character may remain quiescent in our bodies; at any rate they can live there without exciting any active disturbance, for they seem to be under the control of constituted authorities which they evidently respect; but if these salutary forces are incapable of performing their functions, or, if the microbes alight on a soil composed of weak or injured tissues, they fix themselves on such matter and grow with amazing rapidity, and by means of the irritating chemical compounds they cause inflammation in the neighbouring tissues.

To illustrate this point we may again refer to the East: there at the end of the hot season we pass over a large expanse of land with no vestige of animal or vegetable life on its surface, the earth is bare, scorched and fissured in all directions, having for weeks been exposed to the uninterrupted heat of a tropical sun. Suddenly a storm bursts over the country and a deluge of rain falls; with its first drops the whole plain is alive with a multitude of insects and frogs, whose loud croaking fills the air; a mere shower of rain has been sufficient to bring a vast amount of dormant life, including the cholera and other bacilli, into active being. And so with the human body. I must have swallowed large quantities of water infected with the cholera bacillus during my service in Lower Bengal, but on one occasion only, and that from my own fault, they found my intestinal canal unprepared to resist their attack, and then they nearly killed me; the shower of rain had come for them and they took advantage of it. In like manner we can account for the action of unripe fruit or unwholesome food, saline purgatives, and so on, as predisposing causes of cholera; they prepare the surface of the intestines as a fit breeding ground for the cholera bacillus.

Clinical experience had convinced me some twenty years ago that cases of acute inflammation at the juxta-epiphyseal line depended on causes such as those described, that is, to injured tissues which had fallen a prey to a specific microbe. These ideas have since been confirmed by experimental research, for Mr. A. H. Tubby has shown that among animals acute inflammation of the structures forming the juxta-epiphyseal line may with certainty be produced if this part be mechanically injured, and then the staphylococcus pyogenes aureus is introduced into the circulation of the animal. The result of this treatment is an intense inflammation of the injured osseous tissues, which rapidly swarm with this microbe, leading to dangerous septic poisoning. In animals where similar injuries had been inflicted at the juxta-epiphyseal line, but in which the staphylococci had not been introduced into the blood, no acute inflammation occurred in the damaged tissues or in any other part of the body.

And so if one of our weak city-bred children—especially those who have lately passed through one of the eruptive fevers—happens to suffer from traumatism at the juxta-epiphyseal line, say of the upper extremity of one of his tibiae, and if at the same time the part becomes infected by the staphylococcus pyogenes aurei—probably introduced into the circulation through some open sore—acute inflammation is excited in the injured bone, so acute and so dangerous that more than half these patients die within the course of a few days. Should the child outlive the onset of the disease, pus forms in the inflamed bone, and for reasons already given it burrows into the diaphysis and between the

deep layers of the periosteum and the bone, leading to necrosis of the shaft of the tibia. In the less severe cases the inflammatory action may be limited and produce a circumscribed and chronic abscess in the extremities of the bone, such as those first described by Sir B. Brodie. It is quite possible, when the juxta-epiphyseal line of the upper end of the tibia is involved, that pus may pass into the knee-joint—a condition described and figured by Mr. Thomas Smith in his paper on this subject published in the *Bartholomew's Hospital Reports* for 1877; in these cases it is probable that the infective micro-organism from the juxta-epiphyseal line finds its way along the walls of one of the vessels which pass from the diaphysis through the epiphyseal cartilage, and so reach the joint. However this may be, the knee may become acutely inflamed, but is by no means necessarily involved in cases of acute infective osteitis.

If, therefore, we rightly comprehend the nature of this form of disease, its treatment would seem to be clearly indicated, for it is evident that we must endeavour to destroy the living organism which is at the root of the mischief. Incisions into the periosteum, however important they may be, do not reach the source of the disease; to do this we must open the bone at the juxta-epiphyseal line and wash out the infected tissues with a germicide, subsequently maintaining free drainage from the interior of the inflamed bone outwards into antiseptic dressings. We do wrong to wait for pus to form in cases of this description, or in delaying opening the bone for an hour after we have diagnosed the nature of the disease; for the micro-organisms which are at the root of the mischief, as a rule, live and multiply with great rapidity in the part until within a short period they destroy the life of the individual they inhabit, or cause their own death in the suppuration they give rise to in the tissues. The question, therefore, as to when we should operate in cases of this description is answered by directing the bone to be opened immediately we have determined the nature of the disease; remembering that the operation is attended with no danger, but if delayed for a few hours it may be too late. In cases of strangulated hernia and in acute glaucoma we have come to recognise the fact, that so soon as the nature of the disease has been diagnosed we are bound to relieve the constriction in the one case, and the tension in the other; so in acute inflammation of the bone, having determined the nature of the disease, not mistaking it for acute rheumatism of the joint, a free opening should be made into the part, the bone must be opened, and the focus of the inflammatory action reached, if possible, before suppuration has taken place in the osseous tissue.

An Esmarch's band having been applied to the thigh in a case such as that we are considering, a free incision is made through the soft tissues down to the epiphysis and along the shaft of the bone so as to expose the juxta-epiphyseal line. A trephine, about an inch in circumference, is then—with a light hand, so as not to splinter the bone—to be passed through the whole thickness of the tibia. Another incision is to be made through the soft tissues down to the point at which the trephine has perforated the bone, so that a passage is formed through the limb, including the small tunnel in the bone, from either end of which free drainage can take place outwards beyond the surface of the skin. The opening in the bone should be thoroughly and repeatedly washed out with mercurial solution, and then filled with iodoform, after which the limb, having been packed in antiseptic dressings, the elastic band may be removed from the thigh. As a rule neither drainage tubes nor sutures are required in these cases. The limb should be secured by an interrupted splint, so that the dressings may be changed without disturbing the parts operated on; in fact, the subsequent treatment of the case is very much that of a compound fracture. If pus has passed into the knee-joint it will be necessary to follow the treatment as regards the inflamed bone already described, and in addition to open the joint and wash it out with mercurial solution, treating it as we should do an acute abscess in any other part of the body.

The following case is an example of the results of the early treatment of acute juxta-epiphyseal osteitis.

T. E. J., aged 7 months, was admitted into the Westminster Hospital under my care on May 9th. She was a delicate little being, and suffering from whooping-cough. Thirty-six hours before admission into hospital, there being no history of any injury to the part, the child's right leg

became excessively painful and greatly swollen, the infant screaming violently the instant the limb was moved. The child was at once taken to the hospital, and Mr. De Santi, who first saw the case in the outpatient department, ordered her into my wards, and that I should be sent for. Some four hours after admission the child's temperature was 104°, her right leg from the knee to the ankle was of brawny hardness and exceedingly painful. An incision was at once made down to the bone at the juxta-epiphyseal line of the upper end of the right tibia, and a tunnel made through the bone with a trephine; in fact, the patient was treated in precisely the manner already described. The child's temperature on the day following the operation had fallen to 100°, and the next day it was under that point. After three weeks the child was removed into the country, and two months subsequently, when I again saw her, all trace of the osteitis from which she had suffered had entirely disappeared, a result attributable to the fact of the diseased bone having been freely opened and washed out with mercurial solution and iodoform within forty-eight hours after the commencement of the disease.

TUBERCULOUS OSTEITIS.

Having described the conditions which render the marrow contained within the extremities of the long bones peculiarly liable to become the breeding ground of micro-organisms, it is unnecessary to enter further into the subject; the question we have to determine is, whether the chronic joint disease of childhood depends on tuberculosis of the marrow contained in the extremities of the bones entering into the formation of the affected joint. Unless we can satisfy our minds on this point, it seems almost impossible to arrive at any rational conclusions as to how we should best treat the early symptoms of such cases. The difficulty surrounding this question arises from the fact that pathological specimens of these joint affections in their early stages are seldom met with, and the osseous tissue is by no means an easy one in which to detect the presence of a few tubercle bacilli; moreover, in the early stages of these diseases of joints only a limited area of bone is involved, and within this area probably only a few bacilli exist.

During the past fifteen years, in the surgical wards of the Westminster Hospital, three children, while under treatment for the early stages of scrofulous joint disease, developed tuberculous meningitis, and died. In these three cases (one a knee, and the other two hip-joint disease) we had an opportunity of examining the condition of the affected joints at quite the commencement of the disease. In the knee-joint case, a spot of inflamed osseous tissue was found at the insertion of the tendon of the extensor muscle to the tubercle of the tibia; in this congested portion of bone tubercles were discovered. In the two cases of hip-joint disease, in inflamed spots of bone near the circumference of the neck of the femur, on the distal side of the epiphyseal cartilage, distinct tubercles were found, and in these tubercles a few bacilli were detected. The ligaments, synovial membrane, and other joint structures, were very carefully examined, but no trace of tubercles was found in them. A somewhat extensive examination of specimens of chronic joint disease enables me to state that when the synovial or other joint structures are affected with tubercles, tuberculosis of the bone also exists; this remark applies to the more advanced stages of the disease, a subject upon which we cannot enter in this lecture.

My fellow student, Charles Price, as far back as the year 1865, from his own experience in excision of the knee-joint, arrived at the conclusion that disease met with in this articulation as a rule commenced in the ends of the bones. Volkmann was of opinion that strumous disease of joints commenced in the osseous tissue, and his opinion was to a great extent founded on his own observations of the early stages of joint disease. Ollier, and Gibney of New York, are of much the same opinion. Sayers has decided views as to the origin of those chronic joint cases in tuberculosis of the bones entering into the formation of the affected articulation. But we require further pathological evidence on the subject of tuberculosis of bone in the early stages of the joint disease of childhood. Such evidence as we have points to the presence of tuberculous osteitis as being the starting point of what are commonly called scrofulous joint diseases. Pathologists, as a rule, further agree in considering that the outer layers of the cancellous tissue of the bone are the most frequently affected in the early stages of tuberculous osteitis. This fact, as already mentioned, is due in all probability to the marrow in this part of the bone being injured from the action of the tendons or ligaments on the osseous structure into which

they are inserted. In the acetabulum the disease not infrequently begins in the attachment of the ligamentum teres to the innominate bone. In other cases, from the pressure to which the soft structures in the deep layers of the articular cartilages are exposed, they become crushed against the plate of bone upon which they rest, and so form a favourable soil for the growth of tubercles. Bearing on the pathological evidence in favour of tuberculous osteitis being at the root of the chronic joint disease of childhood, we cannot overlook the fact that of all the joints of the body the spine is most frequently affected, the diseased action commencing in the cancellous structure of the bone in these cases. The same remark applies to the head of the first metatarsal bone, the os calcis, and the astragalus. Lastly, in all advanced cases of the chronic joint disease of childhood there is ample evidence of tubercles in the affected structures.

When the tubercle bacilli have found a favourable resting place in one or other of the tissues of the medulla of bone, they speedily become surrounded with layers of cells which protect them from leucocytes or other blood scavengers. Within this nest of cells the microbe multiplies, and its offspring produce either isolated, or it may be disseminated, tuberculosis of the surrounding medulla, and in the course of time the synovial and other joint structures are invaded by tubercle bacilli. Before the disease has advanced to this stage, and when, as in many cases it is certainly confined to the bone, is the time the surgeon may with the greatest advantage attack it in the hope of destroying the microbe which has started the mischief going on within the joint.

We may, however, approach this subject from another point of view. Without doubt a large majority of the cases of chronic joint disease we meet with can be traced back to an injury of some kind; nevertheless, in children injuries to the joints are incapable of causing chronic joint disease such as that which is seen so frequently in general hospitals throughout Europe. This is an important point, because if it can be shown that injuries in themselves are not a sufficient cause to give rise to the disease we are considering, it follows that in such cases there must be something beyond the traumatism to account for this slow but most destructive form of inflammation. Surgeons practising in all parts of India tell us they seldom, if ever, meet with cases of scrofulous joint disease among native children in that country. These children, however, are subject to the same kind of accidents and injuries as Europeans; they are no better fed or housed than the corresponding classes in Europe, and yet practically they are free from these chronic joint affections which are so frequently seen in our hospitals, and which, from a pathological point of view, we have come to think depend on tuberculosis. In this way we are led to think that the tubercle bacillus is the something in addition to a traumatism which is necessary to produce chronic joint disease in childhood. But it may be argued. The tubercle bacillus exists in India; why should native children therefore escape tuberculosis of the joints? It is true this bacillus can live and thrive in India, but tuberculosis is certainly much less common in that country than it is in Europe; and we cannot overlook the fact that hereditary tendencies form an important element in a question of this kind. Beyond this, native children in India live day and night for the greater part of the year in the open air, and in much bright sunshine—conditions which, as we well know, exercise a vast influence on living organic matter; beyond this the native child has a cold bath every day. That sunlight, fresh air, and cleanliness have an important share in preserving living tissues from the inroads of certain forms of micro-organisms is apparent from the following, among other reasons. In the lower animals, such as monkeys, if left in their natural condition in tropical forests, we have no reason to suppose they suffer from tuberculosis; but if these same animals are confined in close sunless cages in our zoological gardens they die off in numbers from phthisis. Or, take another case, the children of our upper classes suffer little from chronic joint affections in comparison with their poorer brethren living in the dark dirty slums of our large cities. Physicians recognise the importance of fresh air and sunlight in the treatment of the early stages of phthisis and other tuberculous affections; with unquestionable advantage they order such persons an open-air life on

board ship during the summer, and a residence in the pure atmosphere of the higher Alps in the winter. The early stages of tuberculous testicle and of other glands seem to be amenable to similar treatment.

From a study, therefore, of the biological relation of the marrow contained in the ends of the long bones, from its physiological functions, and from the teaching of pathology, we are led to believe, as a rule, that chronic or scrofulous diseases of joints are due to tuberculosis commencing within the cancellous tissue of the bones. Without question, such disease may and does begin at times in the deep layers of the articular cartilages; it may commence in the synovial or other soft structures surrounding a joint, but in the case of children we have no evidence to prove that such is the case, but rather the reverse.

Then comes the question, Can we fix on the site occupied by the tubercle bacillus in the early stages of joint disease? In cases of this kind there is always some tenderness over the whole of the joint; but if pressure is made with the tips of the fingers and thumb over the bones entering into the formation of the articulation, we come upon spots which are not only tender but which on pressure cause the child to cry out with pain. These painful spots are permanent; if we examine them to-morrow, or a week hence, there they are; and they indicate definite areas of tuberculous osteitis—the commencement of the disease—which at any moment may extend to the synovial or other tissues of the joint. Doubtless in instances of hip-joint disease in its early stages there is difficulty in ascertaining the precise position of tender areas of bone such as those referred to; the disease may commence in the acetabulum or beneath the articular cartilage of the head of the femur; but it most frequently begins in the neck of the bone, as in the two specimens already referred to, and it is because it begins in this locality and on the distal side of the epiphysal cartilage, that bacilli often extend down the shaft of the femur, and so, after excision of the head of the bone, the disease continues in the trochanteric portion and upper end of the femur.

In the early stages of tuberculous osteitis, as before stated, the symptoms are frequently referred to an accident or injury of some kind; the patient suffers from pain and stiffness of the articulation, and has difficulty in fully extending or flexing the joint without increasing the pain. On pressure over fixed points in the bones entering into the formation of the articulation, the pain is much augmented. These symptoms vary in intensity, but they persist for some weeks, and are increased if an effort is made to use the limb. Within a short period the patient's sleep is disturbed at nights by the spasmodic and painful movements of the limb. There may be little, if any, increase of the synovial fluid in the joint, but its temperature will be found higher than that of the sound limb.

The question then arises as to how we may best treat such a case, and this must depend upon the belief we hold as to the nature of the disease. If we believe, with many surgeons, that these chronic joint affections of childhood are in the majority of cases due to tuberculous osteitis, then it is certain we must direct our best efforts to destroy the tubercle bacillus which has found a breeding ground in the bones entering into the formation of the diseased joint. We had in India at one time a famous general who, with reference to a more substantial but hardly less dangerous form of being than we have to deal with, was wont to say: "When your enemies are in the open go straight at them, keep them moving; if entrenched go at them until you have turned them out of their position"—advice which we may with advantage apply to the case of the micro-organisms we are considering.

We are, however, bound to examine the opinion of surgeons who prefer less active measures in dealing with the early stages of tuberculous joint disease, and who hold that the best thing we can do in such cases is to lay the patient on his back in bed, with proper extension applied to the limb until the diseased joint can be flexed and extended without pain, and on pressure over the bones the patient no longer suffers from pain. Treatment of this kind always takes months, and may require two or three years before complete relief from pain is secured; even after so lengthened a period of treatment there can be no certainty that the

tubercle bacillus had ceased to exist in the previously diseased bone, and only waits a favourable opportunity to recommence its most destructive influence on the tissues. Beyond this we should hardly rest content with having nothing more in the way of treatment to recommend these patients than rest in bed for twelve months, and it may be two years and upwards, and that at the joyous period of childhood, a time when these little beings are overflowing with restless energy, and when constant motion seems almost necessary to a healthy development of body and mind. Nor can one help feeling, as in the case of the lower animals, that life under such unnatural conditions may predispose the individual to the attacks of various forms of micro-organisms. Further than this, surgeons in charge of our London and other hospitals throughout this country and the Continent have reason to believe that in many cases rest and extension are by no means all that could be desired in the class of cases that come under their care.

For instance, Mr. Howse, in his valuable paper published in *Guy's Hospital Reports* for 1892, has brought together the details of 130 cases of excision of the knee-joint in children treated by himself in Guy's and the Evelina Hospitals from the year 1873 to 1884. The cases are not brought down to a later date because, as Mr. Howse remarks, in a question of this kind it is all-important to ascertain the result of treatment some years after the patient has been "cured" according to our most misleading hospital nomenclature. One-half of the cases of excision of the knee-joint operated on by Mr. Howse are stated to have been treated by rest, and many of them by extension for upwards of two years before excision of the joint was deemed necessary to save the limb or life of the patient. The other half of Mr. Howse's patients had been under similar treatment for less than two years, and yet their condition was such that this kind of treatment had to be given up and excision of the knee-joint performed. Do what we will in cases of chronic joint disease among the poorer classes of our larger cities, our efforts are in too many instances unsatisfactory, for many of these children suffer from the stain of hereditary disease which the hand of the surgeon cannot wipe away.

One of my former colleagues, Mr. R. Davy, was at one time rather fond of excising the bones entering into the formation of the knee-joint, both in the early and later stages of tuberculous disease. He was not at the time in the habit of employing antiseptics, and he adopted the open system of dressing wounds; no special care was taken to remove infected bone or other tissues. Nevertheless, most of these cases made admirable recoveries so far as the union of the diseased bones was concerned, and the cessation of the unhealthy action of the previously affected structures. There are, however, serious objections to excision of the knee-joint in children unless to save the limb or life of a patient, and under any circumstances this objection cannot be entertained as applicable to the early stages of the disease with which we are alone concerned at present. But one could not help feeling that the favourable results noticed in the cases referred to must have been largely due to the copious flow of blood which took place at the time and subsequently to the excision of the joint; the ends of the bones and surrounding tissues were thus flushed out and their embarrassed circulation relieved, so that the natural foes of the tubercle bacilli had an opportunity of going straight at their enemy. The subsequent free drainage through the open wound doubtless materially aided the salutary action going on within the tissues. By means of the trephine, however, we may not only secure free hæmorrhage from the interior of the bone, but also make a tunnel through it which will ensure continued and efficient drainage, and further allow the free introduction of a germicide into the affected tissues. All this may be done at an early stage of the disease without running the slightest risk of inflicting any serious injury on the bone or soft tissues provided strict antiseptic precautions are followed.

Having given the reason and method of operating on bones affected with acute infective osteitis, it is unnecessary to make any further observations on the subject, except that a precisely similar proceeding should be carried out in cases of tuberculous osteitis in its early stages; before we have reason to think that caseation or caries of the bone has occurred.

Spots in the tender bones should be exposed, and a trephine of about an inch circumference employed, so as to remove one or more small columns of inflamed bone from the affected joint. After such an operation, the limb should be securely fixed to a splint, so that the dressings can be removed without disturbing the part; at the same time extension must be employed, and kept up for six weeks or so, after which we may omit the extension during the day and employ massage. In another ten days the patient should be placed under an anæsthetic, and complete flexion and extension of the joint carefully made. From that time gentle passive motion of the joint and massage should be employed daily, and the child, if possible, removed to the country and allowed to walk about, taking at first only gentle exercise, the amount and kind being guided by the freedom or otherwise which the patient experiences from pain.

From considerable experience in the use of the trephine in the early stages of tuberculous osteitis, I am able to state with confidence that it is possible in not a few cases to cut short disease of the knee and other joints; and so prevent it spreading to accessory tissues entering into the formation of the affected articulation. Treatment of this kind may, without question, be carried through without running any risk which may not be safely undertaken, if the alternative is either caries of the affected bones or rest for long months in bed. It seems that as in life, so in operative surgery, we too frequently begin at the wrong end; if the experience we gain as we grow in years had been at our command at the commencement of our career, it would have been better for some of us and for many of our patients. And so with surgery, all our knowledge and skill should be applied to preventing and cutting short disease in its early stages; it is then that operative surgery may achieve its greatest triumphs. In this belief I have endeavoured to explain what seem to be the correct principles, and to deduce therefrom the line of practice to be followed in cases of acute infective osteitis in its early stages, and the far more common and hardly less mischievous tuberculous disease of the extremities of the long bones in childhood.

REMARKS ON THE EDUCATION AND TRAINING OF GIRLS OF THE EASY CLASSES AT AND ABOUT THE PERIOD OF PUBERTY.¹

By W. S. PLAYFAIR, M.D., LL.D.,

Professor of Obstetric Medicine, King's College; and Physician for Diseases of Women and Children, King's College Hospital.

In the few remarks I propose to make on my subject I do not, of course, aim at laying before you any novel matter. What I have to say is merely a little common-sense statement of general principles familiar to us all, but too often neglected. I have rather selected this subject as one which may possibly give rise to a discussion of interest, since it refers to matters constantly coming within the province of practitioners to whose charge the health of families is entrusted, and whose opinion on the questions raised may often be sought. We are all willing to admit, theoretically, that "prevention is better than cure"; practically we are apt to overlook prevention, and limit our efforts to cure. My object to-day is to insist on the endeavour at a peculiarly sensitive age in girls of so regulating their lives as to avoid sowing the seeds of mischief, which may, and often do, in future years develop into a disastrous crop.

What I think we ought especially to bear in mind is the highly sensitive nervous organisation of the human female, the development of the emotional element which distinguishes the woman from the man, and influences the character and progress of all kinds of disease in women, but much more especially diseases of the reproductive organs. Up to the time of puberty there is comparatively little difference between the sexes in health, in disease, or in any other condition. Conventionally they are separated, and different modes of education and training will soon make such difference as there is more marked, but boys and girls

¹ Read in the Section of Obstetric Medicine at the Annual Meeting of the British Medical Association, held in London, July-August, 1895.