one point of origin along different vessels ending in the same group of glands.

The rapid development of lymphangitis is well known. In one of Hunter's cases, the prick of a needle was followed by inflammation of the lymphatics and rigors within a few minutes. The rapidity with which it may become fatal is illustrated by a case recorded by Le Dentu, where death occurred in three days.

Varicose dilatation of the lymphatics may occur both on the trunk and in the extremities. Many cases are congenital. Dilatation of the superficial lymphatics is generally met with on the inner side of the thigh; also on the belly and penis, and in some other parts. It is characterised by vesicles like grains of sago, grouped regularly or irregularly. If the vesicles rupture, lymphorrhagia may ensue. Dilatation of the lymphatic trunks is more frequent than of the networks. Sometimes only ampullæ are formed, which are generally soft and painless. If inflammation attack the dilated lymphatics, it spreads rapidly, and may even be fatal.

Less is known regarding varices of the deep lymphatics (as in the conditions termed macroglossia and macrocheilia); but these conditions are rather to be regarded as originating in cystic degeneration. No doubt, however, the primary change is in the lymphatic vessels.

The main lymphatic trunks mostly end in the thoracic duct. Mascagni, Haller, and Cruikshank held that this is the only mode of termination. Lippi, however, described the lymphatics as opening into the portal and other veins of the abdomen. He probably mistook small veins for lymphatics; but it must not be inferred that they never open into the abdominal veins. Some observers—such as Stenson, Meckel, and Fohmann—have also described them as opening into other veins.

Do the lymphatics communicate with the blood-vascular system within the glands? Fohmann and others believed in the existence of such communication, because, when the afferent vessels are injected, the fluid escapes by both lymphatics and veins. But Cruveilhier says that, when this occurs, it is the result of some change in the gland, or of rupture; it more commonly takes place, too, in parts that are not fresh.

Lymphatic follicles are found along the course of the alimentary canal; on the tongue, tonsils, œsophagus, and in the form of the solitary glands and Peyer's patches in the intestine; they exist also on the conjunctiva, and on the Eustachian tube, trachea, and bronchi, as well as in the bladder and vagina; and the embryonic or red marrow of bones is regarded as somewhat analogous to these structures. They consist of a reticulum of stellate cells, in the meshes of which lie characteristic cells like lymph-corpuscles. The supporting tissue may be either aggregated or diffused. The follicles are very vascular, the capillaries forming a dense plexus. The lymph-follicular tissue has not attracted sufficient attention. Swellings characterised as lymphatic may affect them alone or in connection with the lymphatic glands in other parts. They may be simply hypertrophied, or may also undergo ulceration.

Lymphatic glands are placed in the course of the lymphatic vessels. The vessels which enter them are termed *vasa afferentia*, and those which leave them *vasa efferentia*. A lymphatic gland consists of a cortical and a central portion, and is enclosed in a firm capsule of connective tissue, which sends trabeculæ or partitions into the gland, forming alveolar spaces. These partitions are incomplete, and towards the centre the trabeculæ are continued in the form of a network of reticulated bands or cords. In the alveoli and meshes of the network lies the follicular tissue of the gland. Between this and the trabeculæ are spaces, the lymph-passages or lymph-channels, formed of a reticulum of stellate cells with lymph-corpuscles imbedded among them. These lymph-passages are continuous with the afferent vessels. The central portion of the gland contains small lymph-follicles. The epithelioid lining of the trabeculæ is continuous with that of the afferent vessels. At least one small artery enters at the hilus, and is distributed in the follicular tissue.

The lymphatic glands of the human body are about 600 or 700 in number; some of them being very small. They are generally congregated along the course of the blood-vessels, where there is much connective tissue. The proximity of the glands to the arteries is liable to produce difficulty in the diagnosis of pulsating tumours; and their pressure on the veins may give rise to œdema. In the limbs, they mostly lie in the aspect of flexion. The largest glands are those in the groin, axilla, neck, and lumbar region. They are larger in the child than in the adult, and are very small in old persons. The more rapid the changes in the tissues, the more developed and active are the glands. They are normally semi-solid; any degree of softening beyond this is the result of disease or of *post mortem* change.

The glands of the lower limb are the tibial, popliteal, and inguinal. The tibial glands are not constant. The popliteal glands are four in number, lying near the popliteal vessels. The inguinal glands are

divided into superficial and deep, the two sets being connected by lymphatic vessels. The superficial glands vary in number from seven to thirteen, and are arranged in a superior and an inferior set; the former lie parallel with Poupart's ligament, and the latter along the course of the saphenous vein. The deep glands are only three or four in number, and lie in the crural canal.

Each toe is surrounded by lymphatics, which are few in number on the dorsum; the foot and leg are nearly surrounded, except behind. The lymphatics generally follow the course of the veins. The superficial lymphatics of the lower limb pass to the popliteal and inguinal glands. Injury is attended with most danger of implication of the lymphatics when it occurs on the plantar surface of the toes, the outer part of the leg, or the inner part of the thigh.

The lymphatics of the buttock are superficial and deep, and are connected with the inguinal glands; hence these may become affected in cases of injury or disease of the buttock.

The superficial lymphatics of the lower half of the abdominal wall pass to the inguinal glands.

The superficial lymphatics of the external male genital organs are very numerous. No part has so many lymphatics as the scrotum; and their structure here is remarkably varicose. They pass to the inferior inguinal glands. The lymphatics of the penis are on the prepuce and glands. Their connection with the inguinal glands explains the affection of these in cases of venereal ulcer. The lymphatic trunk on the dorsum penis sometimes does not bifurcate, but passes to the glands on one side or the other; this explains why a sore on the penis may be accompanied, sometimes on one side, sometimes on the other, by bubo.

From the urethral lymphatics, two branches pass through to the penis; hence lymphangitis may occur without chancre, being dependent on gonorrhœa. The lymphatics of the female genital organs and of the perinæum also pass to the inguinal glands.

The deep lymphatics of the legs are divided into three sets: anterior tibial, posterior tibial, and peroneal. They have their origin in the connective tissue of the muscles. They enter the popliteal glands and pass on to the inguinal glands; some, however (derived from the gluteal and adductor muscles), pass into the pelvis with the blood-vessels.

The lymphatic glands of the upper limb are the supracondyloid and axillary. The latter are very numerous and large, and are divided into an internal and an external set. They receive the lymphatics of the upper limb and of the chest and a great part of the back. In the lumbar region, the lymphatics pass both to the axillary and to the inguinal glands, the two sets crossing each other. Of the lymphatics of the back, many pass from the right to the left side, and *vice versa*; hence, *e.g.*, the glands in the right axilla may become affected from an injury on the left of the dorsal vertebrae. Some of the lymphatics of the mamma pass into the chest with the vessels. This explains the occurrence of mediastinal tumours in connection with disease of the breast.

REMARKS ON MORBUS COXARIUS.*

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AMONGST the many questions of interest in connection with morbus coxarius, two are prominently worthy of discussion, namely, the constitutional origin of the disease apart from any traumatic cause, and, secondly, the indications for the operation of excision of the joint. The cases I read here to-day so forcibly bear on these two points, that this must be my excuse for introducing them to this meeting of the British Medical Association; and, as my time is limited, and as the only object I had in view in bringing these cases forward was to elicit discussion and an opinion on those matters, I shall restrict the very few remarks I have to offer to their consideration only.

First, touching the pathological question as to the purely constitutional origin of the disease, I may remind my hearers of the discussion which took place at the International Medical Congress in Philadelphia in 1876, when an animated debate occurred on a paper by the eminent orthopaedic surgeon Dr. Sayre, whose presence amongst us twelve months ago in Manchester we all hailed with so much pleasure. In this debate some eminent British and American surgeons took part, notably Mr. Lister, Dr. Agnew, Dr. Gross, and Mr. William Adams;

* Read in the Section of Surgery at the Annual Meeting of the British Medical Association at Bath, August 1878. The pathological specimens of the Cases I, II, and IV were shown at the Meeting. In Cases I and IV, there was complete separation of the epiphysis of the head of the bone, which lay detached inside the capsular ligament, loose in the acetabular cavity.

the debate arising from the view strongly advocated by Dr. Sayre, that morbus coxarius was a disease which always had a traumatic origin, and he then ignored the strictly constitutional origin of the disease. Dr. Sayre's opinion may be gathered from these expressions used by him in that discussion. "Until within a very few years, every author taught that the disease was necessarily connected with a strumous condition of the system, and could not exist without it; and that it was, therefore, necessarily of constitutional origin, and never occurred in the robust and healthy. This doctrine I believe to be incorrect; in fact, by a careful examination of my recorded notes of many hundreds of cases of morbus coxarius, I find that by far the larger number occur in children of perfect health and born of healthy ancestry; and the simple reason is that children of this class are more active and daring, and, therefore, more exposed to accidents and injuries than sickly strumous children, who seldom have energy enough to expose themselves to any danger. But even the strumous constitution requires some local injury to the part itself in order to develop the disease; and, therefore, I am inclined to regard the disease as almost always, if not always, of traumatic origin. Of course, the sickly strumous child, having less recuperative power and vital force to resist disease, will have it developed from a much less exciting cause than would be required to develop the same trouble in the healthy and robust; but, even among the strumous, I believe that, if sufficient care is taken in the investigation, the disease will nearly always be traced to some slight injury which was considered of so little importance as to pass unnoticed at the time, and that months afterwards, when the serious consequences of the slight injury have been fully developed in the well recognised hip-disease, the universal belief in the doctrine of its constitutional origin has prevented the surgeon from examining for any other cause. This has been the cause of the fatal error in the treatment of the disease; for, of course, as long as we believe the disease depends upon constitutional taint, all our efforts will necessarily be directed towards correcting this constitutional poison or element."

The opinions of other representative surgeons who took part in the debate may be gathered from the following.

Dr. S. D. Gross of Philadelphia said: "It strikes me that the second conclusion of Dr. Sayre's paper is entirely at variance with the received opinions of the profession, or, at all events, with my own experience. Many cases of coxalgia, according to my observations, have been cases in which it was impossible to trace as a cause anything like an injury. I have given special attention for many years to these cases of coxalgia: I have inquired 'Has the child received any injury—a blow, or a fall, or a contusion, or anything of the kind?' and in the great majority of instances the answer has been 'No'. I am quite certain that the majority of my cases—and they have been very numerous—have been of this character. That the disease may be developed or excited under the influence of traumatic causes is unquestionable; but I maintain that in the great majority of instances the affection is of spontaneous origin, and that it is not necessary for a blow, or a fall, or any such injury to produce the disease. This is my experience. In regard to the conclusion that it is not necessarily connected with a vitiated constitution, my teaching has certainly been greatly at fault if I err in this respect; I maintain, as the result of my dissections, that this affection cannot occur in a child or in any person whose constitution is not in a state of degradation, or who is not labouring under some constitutional taint." Finally, he says: "I maintain that it is impossible for a child, born of healthy parents, well nourished, well taken care of, unless there is a previous predisposition or some degradation of the constitution, to have coxalgia, pulmonary consumption, or diseased spine."

Mr. William Adams of London, in tracing the origin of the disease to an inflammatory condition, said: "I am satisfied that in a large proportion of cases it will be found that the exciting cause of hip-disease has been some slight injury; yet years of practice have taught me that there are cases in which the disease occurs without any injury."

Mr. Lister, in referring to the influence which our belief in the constitutional or traumatic origin of the disease might have on our treatment, said: "It seems to me that if we have such a disease as struma at all, we have that disease in morbus coxarius. But I admit that traumatic causes are frequently operative, and we know the constant liability of children to be affected by traumatic causes."

At home, we may say that the opinion of British surgeons appears to be almost entirely, if not completely, on the side of the view taken by Mr. Lister, viz., that the disease may have either a traumatic or a diathetic origin. The cases I will shortly read, I think, bear strongly on this point.

The second subject in connection with this affection, which is partly illustrated in these cases, is the operative one. In what cases, and when, are we to excise the joint? When such authorities at home as Erichsen, Holmes, and Humphry have already laid down such excellent rules for our guidance in these terrible cases, it would be presumptuous

on my part to add a word. I would rather bring them forward as illustrations of the sagacity with which these eminent British authorities have treated this important matter. This year, at St. George's Hospital, Mr. Holmes, having reviewed the main motives which have urged surgeons against the operation, such as the fatality, the risk of pyæmia, the uncertainty of the extent of the disease and the disintegration of bone, the doubtful results, every one of which difficulties I met with in my cases, each deterring me from the step, until, as I now think, in one at least, I allowed the more favourable period to pass, goes on to summarise the "pros and cons" as follows.

"1. There are a very few cases of real dislocation in which the dislocated head of bone is exposed and softened, and can be removed by a proceeding so simple as hardly to deserve the name of an operation.

"2. Then there are cases in which the head of the bone lies loose in the cavity of the acetabulum.

"3. But in the great majority of cases, where there is no dislocation and no reason for suspecting a sequestrum in the cavity of the joint, but where there are abscess and disease of the bone, then I think the operation should be undertaken: in the first place, when the patient is suffering from unusual pain; in the second place, when the patient is steadily losing ground, in spite of careful treatment for some weeks, or even when, after a very long period of rest, he has not gained any ground, especially if you have any reason to think, from examining the region of the liver carefully and so on, that the viscera are tending to become affected. And then there are other cases where the operation, I think, is justifiable, on account of the circumstances of the patient, as where you know that for the natural cure the patient must have a long period of treatment, and you think his circumstances are not such that he can obtain it; on that last account, the operation is almost entirely confined to hospital cases.

"4. Then, there are a few other considerations which you must not omit. What are you to do in cases of constitutional disease? You believe the suppuration connected with hip-joint disease is a powerful cause of exhaustion and death, if the lungs and viscera are affected; but it is an exceedingly embarrassing question whether to interfere in these cases or not, and it is a question you had better leave to the parents of the child, after having explained the matter to them as well as you can. You do not believe the patient has strength enough to recover from the operation; on the other hand, you think his prospects without the operation are utterly hopeless, for he must sink under prolonged suppuration. If you perform the operation in many such cases, you may depend upon having a large amount of mortality. But whether the results will be good or bad on the whole I should not like to undertake to say: no doubt, many cases will die; but I think you may reckon every case which you save as being a real triumph of the operation. Then there is the case of pelvic abscess. Pelvic abscess does not absolutely contraindicate the operation. I remember seeing a case in which there was an enormous pelvic abscess, which was laid open by trephining through the acetabulum. In such a case I see no objection to performing the operation. Volkmann, indeed, speaks of it as being one of the main motives for the operation; it certainly is not an absolute contraindication."

Dr. Sayre gives as his opinion the following conclusions: "In the third stage of the disease, when the treatment recommended in this paper has been properly applied without satisfactory improvement, but progressive caries continues, then excision of the diseased bones is not only justifiable, but in some cases absolutely necessary. The operation of excision of the hip is easily performed and in itself attended with little or no danger. After excision of the hip-joint in cases of progressive caries, the recovery is much more rapid and certain, and infinitely more perfect as to form, motion, and the usefulness of the joint and limbs than when left to the slow process of nature."

Mr. Lister, at the same discussion, said: "If effusion without suppuration, a permanent cure may result by drawing off the fluid. If the case has gone on to the condition in which sinuses present themselves, I should be prepared to endorse the proposition that excision is the proper treatment; but, if there is suppuration without an external opening, I am bound to express my strong conviction in favour of merely opening the abscess. I know of numerous cases in which the abscesses have been treated antiseptically, and in which the patients have recovered. Certainly, in these cases the treatment had better results than if excision had been resorted to."

Mr. Erichsen, in the last edition of his *Science and Art of Surgery*, 1877, says: "The result of my own experience is that the mortality directly referable to the operation itself is but small. I have operated in twelve cases. Of these, only two have proved directly fatal; five are now well and going about; three I have lost sight of after their recovery and discharge from the hospital; and two have died, one eleven months, and the other two years after the operation, from constitutional disease, un-

connected with it. When we consider that all these were instances of advanced femoral or acetabular coxalgia, which would speedily have proved fatal if not subjected to operation, we may with justice look upon them as successful so far as the preservation of life was concerned. And in this respect excision of the head of the thigh-bone, or of the hip-joint, stands in a different position from similar operations practised on other joints. The surgeon excises the elbow, shoulder, or ankle in order to restore an useful limb to the patient. Excision of these joints is a substitute for the loss of the limb by amputation—not, as in the case of the hip, to prevent the almost inevitable loss of the life of the patient by continuance of hectic.....But, on comparing the result of operated cases with that of those which recover spontaneously after caries and destructive disintegration of the upper epiphysis of the thigh-bone have existed for years, we shall find that the balance is by no means against those in which excision has been done. As I do not consider the operation necessary in cases of arthritic coxalgia, I do not compare the result of these cases with that of those operated on, but confine myself entirely to those in which there has been destructive bone-disease. In those rare cases of this description, when, after years of prolonged suffering, recovery is at last accomplished by natural means, the limb left is more or less completely ankylosed at the hip, wasted, shortened to the extent of two to four inches, partially flexed upon the pelvis, adducted with the knee possibly stiffened, semiflexed and advanced; the patient is just able to put the toes to the ground, without the power of bearing upon or rotating the limb, but, when he wishes to turn, twisting the whole pelvis by the aid of the greatly increased mobility of the lumbar spine."

Referring to the extent to which we may remove the femur in this affection, Mr. Erichsen says: "There is one practical question with regard to the amount of the upper end of the thigh-bone to be removed which requires consideration, and that is, should the bone be sawn through below the great trochanter? The practice should, I think, differ according to the nature of the disease. If this be femoral, it is best to take away the great trochanter, as the caries has generally reached its cancellous structure, or may be infiltrated with tubercle. But, if the disease be acetabular and the pelvic bones the parts most extensively and deeply affected, it will suffice to remove the head only, leaving the trochanter, which is not affected in these cases. After removing the head of the bone, the upper end should be examined, and any carious parts gouged out. After the epiphysis of the thigh-bone has been removed, the acetabulum must be examined, and any rough or necrosed bone lying at its edge should be gouged away."

Mr. Erichsen gives the statistics collected by Leisrink as follows. In 176 cases of excision of the hip, there were altogether 98 deaths. Of this apparently high mortality, however, only about one-half, or 26 per cent. of the whole cases, can be ascribed to the operation itself, or to the interference of pyæmia and other diseases which are liable to attend operative procedures. The other half of the deaths were produced by extension of the disease, by diarrhoea, or by phthisis, or other diseases of internal organs—probably, in many instances, existing at the time when the operation was performed. The mortality following the operation appears to have been much lower in England and America than in France and Germany."

[To be continued.]

THE ETIOLOGY OF ENTERIC FEVER, WITH AN ACCOUNT OF NINETEEN CASES WHICH OCCURRED IN THE HOMERTON FEVER HOSPITAL.

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II.

(Concluded from page 386 of last number.)

OF the sixteen cases forming the second group, it will be observed that five were nurses, eight were assistant-nurses, two were ward servants, and one was a patient who was performing the duties of an assistant-nurse in an enteric ward; that all were engaged in enteric wards for some time previous to contracting the disease; and that all, up to the date of their illness, were engaged in enteric wards, excepting one (No. 19), who, however, had been in enteric wards, one to within four days of illness. It may here be stated that not a single nurse, assistant-nurse, or ward servant, has contracted enteric fever in the scarlet or typhus fever wards during the eight years of the hospital's existence; and that during the time that the hospital was utilised for the treatment of small-pox patients in 1871 and 1876-77, only a single case of enteric

fever occurred among the staff (No. 17); and that case was in a ward where enteric cases had been treated up to, and for three days after, the commencement of the illness. It is also to be remarked that these cases occurred at irregular intervals from 1871 to 1877, as follows; two in December, 1871; one in April, one in October, and one in November, 1872; one in September, one in October, one in November, and three in December, 1873; one in December, 1874; one in January, 1875; one in March, and one in October, 1876; one in June, one in October, and one in November, 1877. Nor were these cases confined to any one enteric ward. In the pavilion set apart for the treatment of enteric fever, three cases occurred in the lower, and four in the upper ward. In the wards used for the treatment of enteric fever when the accommodation in the ordinary pavilion was insufficient, three occurred in one ward, three in a second, two in a third, and one in a fourth. The age of these sixteen persons ranged between eighteen and twenty-seven at the date of the attack.

Since these cases occurred only among the staff engaged in the enteric wards, there is an *a priori* probability that they did not arise from any defect in the drains or from contamination of the drinking-water in the dormitories or administrative blocks; had this been so, some of the nurses and servants employed in the non-enteric wards who slept in the same dormitories with the enteric nurses and drank water from the same cistern would have contracted the disease.

The cause of these cases must therefore be sought for in the enteric wards. What, then, may have been the possible source of the disease in these wards? Briefly, three: contaminated drinking-water, sewer-air, and enteric fever patients. Here we may state that all the cases of non-infectious diseases sent to the hospital are treated in the enteric wards side by side with the enteric patients. They comprise cases of simple continued fever, pleurisy, pneumonia, rheumatism, etc., and may be shortly described as cases of "other diseases". During the time that the hospital has been occupied with fever-patients, 956 cases of other diseases have been treated to recovery, some of whom at least were liable to contract enteric fever.

Had the drinking-water in the enteric wards been contaminated to such an extent as to give rise to enteric fever, one would have expected that not only would the nurses and servants have been attacked proportionally, but that some of the 956 cases of "other diseases" would have been attacked. But not a single case has occurred among this class of patients, with one exception (No. 13), to be noticed specially hereafter. Clearly, then, the cause was not in the drinking-water. Was it sewer-air? An escape of this air might have taken place from the pipes in the bath-room, or in the water-closet off the day-room, or from the scullery-sink, or from the nurses' closet in the ward corridor; and this might have been due to

1. A local stoppage in the drains;
2. Some defect in the pipes themselves, such as imperfect fixing, breakage or failure on the part of the trap, and broken pans;
3. The pressure of air in the sewer forcing the traps.

With regard to the first and second of these, it will be sufficient to say that, since 1872, a record has been kept by the engineer of all stoppages and defects in the drains of the hospital, and not one is found to correspond with the occurrence of any of these cases of enteric fever. The third will require more detailed consideration.

It was suggested that a great increase of air-pressure in the drains might have forced the traps, and have allowed the escape of sewer-air into the bath-room or day-room of the wards. In this connection, we may observe that the fall of the hospital drains is almost *nil*, and it is therefore unlikely that gas would have accumulated at high pressure so as to force its way through *two* traps. It was suggested, however, that an increase of pressure sufficient to force the traps might have occurred from the sudden influx of a quantity of hot water into the drains. This we regarded as unlikely, seeing that the drains are ventilated; but, in order to test the efficiency of the ventilation, the following experiment was made. Forty gallons of hot water were poured down the sluice-pan. The water in the syphon-bend of the closet-pan adjoining was closely observed throughout the experiment, and it never rose more than half an inch. The ventilation, then, of these drains would appear to be efficient.

Let us suppose, however, that sewer-air had escaped in some way from the drains into the bath-room. Some one would surely have smelt it; but we have not heard of any complaint on the part of the nurses or patients of any unpleasant smell in the bath-room. We should have further expected that had sewer-air been the cause of the disease, the attacks would not have been confined to a special class of those using the bath-room—viz., to the nurses and servants. None of the 956 patients convalescing from "other diseases" who used the closets and bath-rooms daily, some of whom at least were liable to contract enteric fever, were attacked; and, had the cause of the nurses' attacks been the