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

escape of sewer-air into the bath-room, a proportion of those patients would have taken it.

Nor is it likely that the escape of sewer-air from the closet attached to the day-room was the cause, for in that case the patients would have been most liable to take the disease, inasmuch as they, and not the nurses, occupy the day-room and use the closet attached to it.

Nor is there much probability that escape of sewer-air from the scullery-sink caused the disease. The scullery is most frequented by ward-servants and patients. Now, only two ward-servants have contracted enteric fever, and no patients have done so. Had this sink been at fault, some patients at least would probably have suffered.

There is yet another possible source of sewer-air being the cause of these attacks. We have mentioned that each pavilion is provided with a closet not ventilated for the use of the nurses and servants. These closets have never been found to be out of order; and these cases could only have arisen from them if the pressure of air in the sewer had been sufficient to force the trap. This is possible, but not in my opinion probable, and for the following reasons. Had this been so, one would have expected that all the servants in the wards would have been attacked in much the same proportion, inasmuch as they all used these closets; but we see that only two ward-servants have been attacked, whereas the due proportion would have been five. Further, since the main drains of the blocks used permanently for enteric and scarlet fever unite at a short distance from the nurses' closets, already referred to, any air forced back through either of these closets would have been equally impregnated with enteric fever poison, and consequently the staff in each block would have been equally subjected to its influence, and one would have expected a like number to have been attacked in each; but we have seen that none of the nurses and servants in the scarlet fever block were attacked.

From these facts, we think it will be clear that these cases of enteric fever were not due to contaminated drinking-water either in the dormitories or in the wards, or to sewer-air in the dormitories, wards, or nurses' closets attached to the wards. To what, then, were they due? We shall endeavour to show that they were due to the enteric fever patients themselves.

The cases, we have seen, were confined exclusively to the staff on duty in the enteric wards. Whilst the staff in these wards were attacked, the patients convalescing from "other diseases" and living in the same wards, many of whom were young, and some of whom were probably liable equally with the nurses to contract enteric fever when exposed to its poison, escaped. How is this liability on the part of the staff, and this immunity on the part of these patients, to be explained? It is almost certain, we think, that there must have been a cause present in the wards operating on the staff, but not on the patients convalescing from "other diseases". Did, then, the duties of the nurses subject them to any conditions in the wards from which these patients were exempt? If so, were these conditions such as to afford a cause sufficient to produce enteric fever? The great difference in the conditions of life of the nurses in the wards, as compared with the patients with "other disease", was this: that it was the duty of these nurses to nurse the sick, and, in the performance of this duty, they were exposed to the exhalations from the lungs and skin, and to the effluvia from the stools, of the patients. As this was the only important difference in the conditions of life of these two classes of people, we may conclude that the cause of the enteric fever among the staff of these wards was intimately connected with it. If this be so, and as it is improbable that they could have contracted enteric fever from patients sick with diseases other than the fever, we are forced to the conclusion that they contracted it from nursing the enteric fever patients themselves; and we believe that, in the cases we are now considering, the cause of the disease was the fresh enteric stools.

That this is the explanation of the origin of these sixteen cases, we think there would be strong reason to believe, on the negative evidence afforded solely by the fact that no other cause adequate to their production can be found, but there is positive evidence available to lend strong support to this view.

We find that the majority were attacked soon after entering on duty in enteric wards. The duration of duty in enteric wards, before being attacked, was in 14 cases as follows: twenty-three, twenty-four, twenty-seven, twenty-eight, thirty-four, thirty-six, thirty-seven, forty-one, forty-two, and fifty days, and five, six, seven, and thirteen months. That ten out of sixteen cases should have contracted this fever within two months of entering on duty in enteric wards is, we think, strong evidence in favour of the view that the disease is communicable from the sick to the healthy; and one doubts if, in the nursing of a disease so eminently communicable from the sick to the healthy as typhus fever, more startling results would have been found.

Again: we find that the nurses' assistants and ward-servants are attacked in direct proportion to the amount of exposure to the effluvia

from the stools of the enteric fever patients. The assistant-nurses are most exposed, the nurses in a less degree, and the ward-servants least of all. Of the sixteen cases, nine (including the patient who was performing assistant's duties) were assistant-nurses, five were nurses, and two were ward-servants. In the performance of their duty, the nurses and assistant-nurses have to change the linen, often soiled, of the enteric fever patients, and it is a special duty of the assistants to empty bed-pans; in the absence of an assistant, the nurse has to perform this duty, and night-nurses have always to do it. In the performance of these duties, they are, of course, much exposed to exhalations from the bodies and to effluvia from the stools, which they are liable to inhale, and may even swallow particles of faecal matter which may have adhered to their hands or dress.

Some of the cases deserve special attention. M. Mison (No. 2) had for nine months performed the duties of ward-servant. She was then promoted to be an assistant-nurse, and placed on duty in an enteric ward. *In less than one month, she was warding with an attack of enteric fever.* After her promotion, the conditions of her life in the hospital continued the same as before, except that she was brought directly into contact with enteric patients, became liable to inhale the effluvia from their bodies and stools, and, as soon as this was the case, she contracted the disease.

S. Woodrow (No. 7), engaged as an assistant-nurse, and placed at once in an enteric ward, twenty-eight days thereafter, was warding with enteric.

J. Hannaford (No. 6), engaged as a nurse, on entering service, was placed on duty in an enteric ward, and, thirty-seven days thereafter, was warding with enteric fever.

E. Tingey (No. 10) and R. Tingey (No. 12) were two sisters. The former contracted the disease after fifty days' duty in enteric wards, and the latter after about thirty-five days. A third sister (Sarah) was also a nurse in the hospital. She had had an illness in childhood, which seemed from the history to have been enteric fever. She was for many months nurse in an enteric ward, but did not contract the disease.

F. Weaver (No. 15), had for seventeen months nursed scarlet fever patients solely. She was then transferred to be nurse in an enteric ward, and thirty-five days thereafter was warding with enteric fever. There was no assistant in her ward on several occasions, owing to nurses falling sick of typhus, so that she was more exposed to the effluvia from the stools than she would otherwise have been. Here, the only difference in this nurse's duties was that, instead of nursing scarlet fever, she was put to nurse enteric fever patients, and, shortly after exposure to this fever, contracted the disease.

The case of the only patient who contracted enteric fever is also very remarkable. E. Graney (No. 13) was a patient in an enteric ward. She had not previously had enteric fever. The question arises: Did she differ in any way from the other patients recovering from "other diseases" in the enteric wards, in her relations to the acute enteric cases? There was this very important difference. Having requested an appointment in the hospital, she was put to perform the duties of an assistant-nurse, with a view to ascertain how far she was qualified for such a situation. She differed from the nine hundred and fifty-five "other disease" patients treated to recovery in the enteric wards in this particular, that she performed the duties of an assistant-nurse, and, consequently, was often engaged in emptying enteric stools, as well as changing soiled linen, etc.; and in this particular, she alone of all that number of patients resembled the assistant-nurses. In about six weeks after beginning to perform these duties, she was laid up with enteric fever. She died, and the diagnosis was verified *post mortem*.

OSTEITIS OF THE DORSAL VERTEBRÆ FROM A FALL.

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THE case now to be related may be thus briefly summarised. It was one of osteitis of the bodies of certain dorsal vertebræ, occasioned by a fall from a horse. Perfectly latent, in twelve months it caused paraplegia through a slow process of pachymeningitis, which produced compression and atrophy of the spinal cord, with descending sclerosis of the lateral columns. Angular curvature appeared at a still later period. Death resulted from surgical kidney after eight years.

The patient was a medical practitioner, aged 56 at the time of the accident to be described. He was of vigorous intellect and excellent constitution. In May 1870, he was thrown from his horse, but was unaware of any injury till his arrival at home, when his son discovered a fractured clavicle. He suffered absolutely no inconvenience, and con-