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-

tinued actively engaged in practice. In the last two days of 1870, he had a severe attack of urticaria. On January 1st, 1871, the weather being then very cold, he was called out of bed at night to see a patient, and, on his return, after exposure to the cold, it was noticed that he was greatly depressed and shivering. The urticaria, at this time subsiding, entirely disappeared the following day. In the course of the next fortnight, he suffered severe pain and irritation at the neck of the bladder, having never previously suffered from urinary symptoms; but slight accumulations of urine distressed him, and a large-sized flexible catheter had to be passed, which was done without difficulty. On account of this sudden illness, I saw him in consultation on January 17th, 1871. The patient was then ill, exceedingly depressed; but there was found neither abscess nor any cause for the urinary symptoms, and healthy urine was drawn off. A week later, a large abscess formed in the ischio-rectal fossa, and this was followed by secondary abscesses in the left thigh and leg and right arm, with a puffy swelling on the scalp, which was followed in the course of years by exfoliation. In the spring, he was able to walk in the garden; but, on April 15th, the first signs of loss of power in the leg manifested themselves, and the paraplegia rapidly increased. From this time, he was never able to use his legs again. He was occasionally able to get out in a Bath chair, but the movement caused pain.

During the first twelve or eighteen months after the commencement of the paralysis, there was much rigidity of the paralysed muscles, probably due to the irritation of the condensing spinal membranes, and the patient was much annoyed with frequent involuntary movements of the legs, especially at night; but their muscles remained fairly nourished. Cutaneous sensibility was never greatly diminished; but he suffered much from persistent pain aggravated in paroxysms around the base of the chest. To relieve this pain, hypodermic injections of morphia were used. It should be mentioned that his perceptive centres were distinctly hyperæsthetic.

Urine was passed voluntarily; only once or twice was the catheter required. The urine was generally acid, and only occasionally contained mucus and, towards the end, a small quantity of blood. His bowels were constipated but easily opened. The vertebral column was repeatedly examined, with an absolutely negative result till more than two years after the accident, when the sixth dorsal vertebra was found abnormally prominent.

On two occasions, the patient suffered from alarming attacks of cardiac distress, for which no cause was discovered. Though at times depressed, the intellectual faculties remained clear. Death took place in April 1878, after an illness of eight years. The immediate cause of death was uræmia.

Necropsy.—The sixth and seventh dorsal vertebræ were completely incorporated, so much so that the only evidence of a previous separate existence of the two bodies was in the indications rather than the remains of the fibrous layer of bone forming the upper surface of the healthy body. The united bodies were wedge-shaped and bent at an angle of 130 deg.; their spongy tissue had fully recovered itself and presented its usual appearance. No trace of caries existed. A lamina of new bone ran along the front of the bodies. The vertebral laminae were united together by bony matter. The vertebræ below were healthy. The spinal cord was not adherent to the interior of the canal; it was examined from the level of the second cervical vertebra downwards; the upper portion was greatly compressed by the close adhesion of the membranes, and was so much reduced in size, that the section measured only three-eighths of an inch transversely, and a quarter of an inch from front to back. Moreover, at this point the contraction of the thickened membranes had twisted the cord half round, so that the fissures pointed from left to right. For the upper three inches and a half, the membranes were remarkably thickened and very dense, and adhered to the cord itself so closely, that very careful dissection was required to effect its separation. The anterior fissure, which had been twisted to the left, was also torn open, so as to cleave the substance of the left antero-lateral column. In the upper half of this three inches and a half, the grey matter was clearly defined, but was attenuated; below this, the cord was completely softened. Further down, the cord recovered its natural consistence, and the grey matter reappeared, but was unusually pale. In passing down, the anterior horns became indistinct, and a broad tract of secondary sclerosis ran down by the side of the posterior horns, extending into the lateral columns. This was especially marked on the left side. This tract of sclerosis ceased in the right side before reaching the lumbar enlargement; but, on the left side, the grey tract expanded in this portion of the cord into a rounded projection in the lateral columns. A portion of bladder examined presented a livid thickened mucous membrane, and the kidneys had the ordinary characteristics of the so-called surgical kidney. An accident prevented the microscopical examination of the cord.

REMARKS.—The patient had a fall from his horse nearly twelve months before the earliest symptoms of paralysis, and was so entirely unconscious of any evil consequences from the accident, that he never attached any importance to it. Nevertheless, it now appears that, during the period mentioned, a slow osteitis, entirely latent, was going on in the bodies of certain vertebræ, the inflammation in the course of time extending to the dura mater of the spinal cord through the medium of the intervening fatty and areolar tissue; and, eleven months after the fall, the rapid development of paraplegia produced by the pressure of the thickened spinal membranes was the first thing that indicated anything being amiss with the spine. I have no means of connecting the remarkable symptoms which immediately preceded the development of paralysis with the special disease at that time, no doubt, slowly advancing, except by the general observation that the unusually severe urticaria with which they commenced had doubtless a neurotic origin; but I am quite unable to form a judgment as to the condition which caused the intense vesical irritation and the succeeding perineal abscess beyond noting their concurrence in point of time with exposure to intense cold and with the rapid disappearance of the urticaria, whether or not as a result of the exposure I am unable to say. It is very noteworthy that, although the paralysis set in eleven months after the fall, it was not until twelve or fifteen months later that any change was discovered in the direction of the spinal column. By that time, partial absorption of the bodies of two vertebræ had made considerable progress.

The process of death merely exemplified one of the normal terminations of paraplegia; viz., by disorganisation of the kidney through low inflammation propagated from the bladder up the ureters; but I may add that the disease of the kidney was so insidious in its approach, and the change in the urine by which, no doubt, the inflammation was first set up in the bladder, was so inconstant and moderate, that I was quite unprepared for the rapidity with which the uræmia hurried the case to its termination.

I have only to add that the notes are exceedingly imperfect, from the circumstance that my friend lived at a considerable distance from Birmingham, and my visits were occasional only.

ON A POSSIBLE SOURCE OF ERROR IN THE DIAGNOSIS OF FUNGUS IN THE EAR.

By E. CRESSWELL BABER, M.B.Lond.,

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SOMETIME since, on syringing the ears of several patients with the object of removing discharge, I noticed in the effluent water dark masses, which, on microscopic examination, were found to contain mycelium and spores of a vegetable fungus. The patients were suffering either from chronic purulent inflammation of the middle ear, or from a discharge from the external meatus and outer surface of the membrana tympani, without perforation of that structure. This occurred so frequently, both in patients seen at the dispensary and in private practice, that I was forced to conclude either that the occurrence of fungus in the ear was much commoner than is usually supposed, or else that the fungus in these cases was not derived from the ear at all; in which case, of course, its only source could be the syringe. I, therefore, examined the interior of the syringes employed, and with the following results. The syringes used were two in number, one at my own house and one at the dispensary, which, for the sake of brevity, I shall term respectively syringe A and B. They are both three-ounce brass ear-syringes of Maw, and in them the piston is covered with a cap of leather, which is freely lubricated with oil and projects beyond the end of the piston. On examining the interior of syringe A, it was found that the lower surface of the piston (*i. e.*, the surface furthest removed from the handle) had adhered to it a quantity of clear white gelatinous-looking material, in which were embedded numerous brown granules, with dark-brown masses, some opaque white material, etc. In syringe B, the lower surface of the piston had attached to it a dark-brown substance, and brown masses were also seen adherent to the interior of the end of the syringe, with which the piston comes into contact when it is pushed down. Several slides were mounted of the material on the lower surface of the pistons and from the interior of the syringe, and it was found that, in the case of both syringes, it contained a quantity of mycelium and spores of a fungus, probably a form of *Penicillium* grown in a liquid. The mycelium was branched and jointed, and the spores were arranged in single rows or groups, not in spore-heads. Syringe A had been in constant use for about two years; and, after each time of using, I am in the habit of removing the water, as far as possible, by drawing the piston up and down rapidly several times. The latter was not removed to dry it; in fact,