NOTE ON AN UNUSUAL CAUSE OF ENTERIC FEVER INFECTION.

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Any circumstances which explain the incidence or causation of enteric fever must be always of interest. In this connection, the facts reported as to the origin of certain recent cases of enterica in the Aldershot Command are of special importance. While the actual details were worked out by Captain Gallie, I am indebted to Major Elkington, the Sanitary Officer, for a summary of the reported facts. On October 14th, 1904, a man of the Bedfordshire Regiment was found to be suffering from enteric fever. The source of infection in this case appears to have been at Colchester, from which garrison the man had come, some fourteen days before feeling ill. This man remained in his quarters for some few days before reporting sick. On October 31st another case of enterica was noted in the case of a bugler, aged 15, belonging to the same regiment, and who had arrived in the Command with the battalion on September 23rd, and, presumably, contracted the disease locally, as he had not been away since his arrival.

An analysis of the local conditions indicates that the water supply cannot be reasonably suspected, as it is derived from an Artesian well, and in no way liable to pollution. In a similar manner the milk supply is not open to suspicion, as the dairy from which it is obtained was found to be in a good sanitary state, and, moreover, the regimental arrangements secured scalding of all milk before issue. The possibilities of the lad having acquired infection by means of casual purchases from hawkers are remote, as itinerant vendors are not allowed within the lines, and the season of the year was against the chances of drinks being sold by these dealers on the adjacent road. No sanitary defects were known to exist in the actual huts and barracks. A water carriage system of sewage removal is in use, the drains discharging ultimately into a septic or digestive tank, some 60 yards distant from the hutments. This tank is covered and surrounded by a palisade of wood some 9 feet high. From this tank the sewage is conducted by iron pipes to a Stoddart's Filter, after passing through which the sewage effluent is passed on to land. This irrigation ground is rather more than 150 yards distant from the nearest occupied quarters. The habits
of the boy were closely investigated. He had not been on furlough since he arrived in the garrison, nor had he frequented drinking houses in the camp or vicinity. On close examination, Captain Gallie found that the band boys of this battalion sometimes drank from a stream in the neighbourhood of Oxney Farm, but as this water had been very generally used by troops during the past summer without any suspicion or doubt as to its quality, there is no reason to attribute the infection in this case to its consumption. In the face of these negative facts, it was difficult to explain satisfactorily the origin of this case of enteric fever. Captain Gallie, however, recalled the fact that on October 15th it was discovered that some one had broken into the Stoddart Filter enclosure and displaced the spreaders. On examining closely the other boys in the barrack room in which the patient had also been quartered, he obtained the important admission from them that they, including the patient, were the culprits, not only having broken into the enclosure but displaced the spreaders. On their return to their barrack room to tea, they washed their hands because they were dirty; but on talking over their escapade they realised that they might get into trouble. The consequence of this was that the boy Taylor (the patient) volunteered to go down to the filter and replace the spreaders. He did so, and returned to the barrack room for his tea, apparently not re-washing his hands. It is noteworthy that none of the other boys who damaged the filter have developed any symptoms of disease.

These are very interesting facts and it is legitimate to infer that to the handling of the sewage spreaders, without washing his hands before eating, the boy, who alone contracted enterica, owes his attack of the disease. The question at once arises, was it possible for the sewage, reaching the filter by the spreaders, to have contained specific enteric material? Yes, it was possible. An undoubted case of enteric fever had been recognised from these very lines on October 14th, and he had been ailing for a few days before reporting sick; in other words, his specifically tainted excreta had been passing into the sewage installation for three or four days at least, before these boys interfered with and handled the sewage distributors. It has long been recognised that the conditions existing in a septic tank and in biological sewage installations generally were not necessarily inimical to the survival of the specific organism of enteric fever; but I am not aware of any exact observations ever having been made of the direct passage of the B. typhosus through such an installation, and its isolation from either the septic tank
effluent or from the filter effluent. Horrocks and I long ago planned such an experiment, but circumstances prevented our ever putting it into effect. This case appears to me to confirm very forcibly the view which we both held as the outcome of our experiments on the viability of the enteric bacillus in soil and sewage, that this specific micro-organism would survive passage through a biological sewage installation. The only exact experimental observations in support of this view are those of Houston, made for the Royal Commission on Sewage Disposal. In these experiments B. pyocyaneus was added deliberately to sewage, both at Hendon and at Leeds: at the former place as the sewage flowed on to a continuous filter of the Ducat type, and at the latter place as it flowed into a septic tank preliminary to contact beds. In the case of the continuous filter bed, B. pyocyaneus appeared in the effluents within less than ten minutes from the start of the experiment, and was present, at first invariably, later at irregular intervals, up to the tenth day. In the case of the septic tank and contact bed, B. pyocyaneus appeared in the septic tank liquor within two and a half hours from the start of the experiment, and in the contact bed effluents at the earliest possible times, that is, the first emptying of the bed. The organism was recovered from both the septic tank liquor and from the contact bed effluent as late as the ninth day. These are very striking results and absolutely consistent with the view taken as to the origin of this case of enteric fever at Borden, Aldershot.

The more important lessons to be drawn from this case are: (1) the prime necessity of scrupulous care in the sterilisation of all discharges from the enteric sick; (2) the danger which exists from an undetected case of enteric fever, and the need of the earliest possible detection of these cases; (3) that biological sewage installations, although yielding very good effluents chemically and bacteriologically, cannot be trusted to remove the elements of potential danger to health; (4) the undesirability of locating sewage works in places at all accessible to the inquisitive and irresponsible.

For the elucidation of the important sequence of events relating to this case, the fullest credit is due to Captain Gallie, in whose sanitary charge the barracks were.

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