TYPHOID CARRIERS.

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(FELLOW).

SINCE the publication of the account of the Brenty and Brislington outbreaks of typhoid fever, by Dr. Walker Hall and myself, in the Transactions of the Royal Society of Medicine (Epidemiological Section), in April, further particulars of interest have been observed with regard to the woman who had been associated as a carrier with these outbreaks; and also a fresh instance of carrier infection has come to light in Bristol.

It will be remembered that the carrier in the Brenty outbreak was admitted to the institution (an inebriate home) as a patient in April, 1906, put to kitchen work soon after admission, and on to dairy work in October. Between October, 1906, and November, 1907, twenty-eight cases of typhoid fever and two deaths occurred amongst those inmates of the home and officers who had special access to milk, whether they resided on or off the premises. Mrs. H. had had typhoid in 1901, but was to all appearance in 1906-7 in perfect health; all milk passed through her hands. Suspicion fell on her in November, 1907, and she was excluded from food-work as an experiment; her exclusion was followed by complete cessation of the typhoid fever.

Her history was then searched into for further corroboration. A striking instance was found in the case of a typhoid outbreak which occurred at a home for girls at Brislington, near Bristol, in 1904, which was unexplained at the time. *The same woman* had been taken on as cook in February: nothing happened until May, when a series of cases of typhoid fever occurred amongst the girls, attacking nearly every one, with two deaths, and lasting until the cook left and the home was broken up. Lastly, in 1905, she was taken on as cook at a third home for girls in Clifton in March; nothing happened until May, when one of the girls sickened of typhoid fever.

After this woman was isolated in November, 1907, she was kept strictly secluded, and away from any food preparation, and her excreta were examined from time to time. She was first proved to be a carrier on

December 20th, when typhoid bacilli were recovered from her stools; they then remained free until April, when the bacilli reappeared and continued to be found during May. In June, 1908, though unable to infect others, she succeeded in infecting herself, passing through a slight attack, in which condition of stools, temperature, pulse, and general condition indicated an auto-infection with typhoid.

The second person found to be a carrier in Bristol was the mother of a family of five children. Her husband died of typhoid fever in October, 1907, and nothing further was reported until the first week of June, 1908, when four of the five children were notified almost simultaneously as suffering from typhoid fever. On inquiry it was found that the mother, the food preparer, had herself suffered from symptoms very suspicious of typhoid fever shortly after her husband's illness in October, but a negative Widal result had led to non-notification. This woman's blood gave a *complete* and immediate Widal reaction in 1-in-200 solution. Professor Walker Hall is at present engaged in further pathological inquiry.

PERIODICITY.

A point of considerable interest is the period of time at which, in the instances quoted, the outbreaks tend to commence. Thus, in the 1907 Bentry outbreak, in the 1904 Brislington outbreak, in the 1905 Clifton outbreak, in the 1908 auto-infection, and in the 1908 case, effectivity was not manifested until May or June, although opportunity of infection was not wanting in the earlier months of the year.

The full meaning of this periodicity, and the extent to which the apparent law may hold in future instances, can only be surmised at present.

THE IMPORTANCE OF THE FOOD PREPARER.

It is now well known that many carriers may prove ineffective over a long series of years, but this is not to be wondered at if they are not engaged in food preparation or in dealing with milk. It seems certain that infection is conveyed into the food or milk by the hand more or less directly, after attending to the calls of Nature, and omitting to wash the hands.

The personal factor in endemic typhoid infection is probably of far greater importance than is usually recognised, and the May periodic recurrence of infectivity in carriers may pave the way for the subsequent autumn wave of typhoid prevalence, and for the water infection or milk outbreak which may then take place.

PROPHYLAXIS.

Obligatory cleansing of the hands amongst cooks, dairymaids, and raw food preparers of every kind is obviously essential, and in institutions can be readily enforced.

Physicians should consider arrangements for the after-care of typhoid convalescents, and some control over their condition should be for a time maintained. State control may be anticipated with regard to food factories. As to cure, surgical attention to the gall-bladder, the seat of the harboured bacillus, has in one instance proved successful, but is too drastic a process to recommend. No drugs are as yet known to be effectual; but bacterial methods may prove to be available. The whole subject needs full consideration, and must be carefully worked out and studied as instances arise. These instances will probably be sufficiently frequent if they are carefully and systematically looked for.

[*This Discussion applies also to the Papers by DR. ARCHIBALD, page 581, and DR. SAVAGE, page 589.*]

LIEUT.-COL. A. M. DAVIES (London) said he was fully convinced of the importance of the carrier theory, but thought personal infectivity could not be universally admitted. At present measures of isolation were not habitually practised in general hospitals in regard to enteric cases, and yet spread in hospital was very rare. A large experiment was carried out during and after the South African War, when for very many months large numbers of convalescent enteric patients returned to this country. Many of these must have been excreting enteric bacilli, and were theoretically infective. No outbreaks, however, occurred in barracks at Home Stations (with one exception) that could be referred to personal infection. The absence of spread by direct infection in past years, and at the present time in general hospitals treating enteric cases without isolation, might be explained either (1) by variation in individual susceptibility to the diseased poisons ingested, or (2) by variation in virulence of the bacilli excreted. With regard to (1) it was within everyone's experience that some persons were much more liable to catch infectious disease than others. With regard to (2) he thought that special outbreaks such as had been described by Dr. Davies at Bristol were probably due to this cause, an exaltation of virulence in a particular strain of enteric bacillus, the cause or causes of which would be special change of environment, *i.e.*, factors in evolution.

DR. W. C. HOSSACK (Calcutta) said Colonel Davies had called attention to a point in bacteriology to which perhaps too little attention had been paid in the

past, the small relation frequently borne by the amount of infection to the amount of infective material and the opportunities of infection. In other words, the constitution of the patient, the medium of development, was quite as important as the presence of the bacillus.

That was particularly well exemplified in Calcutta in the case of two special diseases, plague and cholera. Of these the latter was the more important. In both diseases, with continued opportunities of infection, it was the exception for more than one case to occur in a house; 75 per cent. of the cases occurred singly. That was most striking in the case of cholera, where it was certain that all the numerous inhabitants of the area round an infected tank were continually exposed to infection, considering their domestic habits and the fact that the tanks were used for all household purposes. In most cases, when the water of presumably infected tanks were examined, the cholera bacillus was recovered.

These striking instances must bring it home to everyone that the bacillus was very far from being the sole determining factor in disease, and that more attention might well be paid to the aspect of infection.

DR. E. M. SMITH also took part in the discussion.