REPORT ON AN OUTBREAK OF DIPHTHERIA IN CORNBURY STREET, OLD KENT ROAD.

BY

F. J. WALDO, M.A. M.D. Camb., D.P.H., M.O.H. of St. George's, Southwark, and of the Temples; Tutor in Public Health to St. Bartholomew's Medical School.

THE first case was notified on the 14th of July, and the last on the 8th of October, 1896. There were fourteen cases in all, five proving fatal.

With the exception of two, all those attacked were under the age of ten years. Seven were males and seven females.

Cornbury Street is a narrow *cul de sac* 160 yards long, running at right angles to the Old Kent Road. It consists of forty-seven two-storied houses, and is inhabited by carmen, watermen, and others of the labouring class.

The main facts of the somewhat complicated drainage system may be thus summarised:—

1. The w.c.'s are, with one exception, disconnected from houses, and are of fairly good type as regards construction and flushing. Defects were found in eleven of the w.c.'s.

2. The whole of the pipes from closet-pans to street sewers are grossly defective.

3. In two cases these defective pipes pass directly under houses.

4. The street sewers are without ventilation, there are no intercepting traps, and until recently one of the street gullies has been untrapped and frequently choked.

Water Supply: is from the Southwark and Vauxhall Company's mains. The service, so far as I can learn, is fairly, though not invariably, constant. The house-drains run from $1\frac{1}{2}$ to 3 feet below the water supply pipes. The storage cisterns are additional dangers owing to their never being kept in practice in a cleanly condition.

General Structural Condition.—The houses are built of brick roofed with slates, generally watertight. The houses are from fifty to sixty years old, and there is no attempt at impermeable flooring. In the absence of cellars the ground flooring is laid on joists separated by a few inches from the underlying soil, and there is no provision for ground ventilation. Their foundations are damp. The back-yards and fore-courts are many of them unpaved, while others are imperfectly paved with concrete. At the backs of that side of the street which includes numbers thirty-seven to forty-nine, runs a strip of vacant ground, some 3 feet wide and 95 feet long, which, until recently, was a general dumping-ground for rubbish, often of an offensive nature. The dustbins are situated in the back-yards; all of them are made of wood, and many are without covers.

History of the Outbreak.—On the 14th of July a girl aged five, of 41, Cornbury Street, was notified for diphtheria. Owing to a skin affection, she had

not attended school for six months previously. She was supplied with milk from a dairy situated in Cornbury Street. The medical man in attendance was unable to trace the source of the infection. This girl died in the upper front room, which was subsequently fumigated with sulphur, and all clothes and bedding disinfected.

On the 1st of August another girl, aged one year and ten months, died in the same room, the certified cause of death being "diarrhœa." On the 5th of August a boy, aged six, was notified for diphtheria. He was treated in the lower front room, where he died, and the mother was now childless. On the same date, a child of $2\frac{1}{2}$ years was notified eleven houses off on the same side of the street. The mother of this child had, just previous to its attack, been cleaning up at No. 41. It seems reasonable to suppose that the second and third patients contracted the diphtheria from the original case. On the 17th of August a young man of twenty, a lodger, was notified from the house where the outbreak began. It is more than suggestive that this young man occupied the lower front room in which patient number two was nursed and died. The contents of the room had been disinfected, and the room fumigated with sulphur. Between the 17th of August and the 10th of September, *eight* further cases were notified at intervals of from two to eleven days. After a fortnight another case was reported, and nine days later the last of the fourteen cases. Three of the fourteen cases were at No. 41, three at No. 37, two at No. 36, and the rest scattered about on both sides of the street.

Dealing, next, with common general conditions, we find:—

(a) *School.*—There is no reason for attributing this strictly limited and local outbreak to the influence of any particular school or schools. Had any institution in the neighbourhood been the active source of contagion, it is obvious that many more cases would have been reported in the neighbourhood.

(b) *Milk.*—The supply was obtained from various sources—notably from a dairy in the street. Most of the houses dealt with that particular milk vendor, so that any specific infection from that source would have caused a more general outbreak in the street.

(c) *Water.*—By a similar line of reasoning, water may be excluded.

(d) *Drainage.*—The outbreak cannot be traced to defective drainage. Cornbury Street is sewered by two independent systems.

Nine cases occurred in houses connected with the boundary sewer, and five in those connected with the Old Kent Road sewer. At the same time it is probable that bad drainage, together with dampness and other unwholesome surroundings, has a considerable indirect influence in predisposing to attacks of diphtheria. It is a well-known

fact that sewer gas in houses is a fruitful cause of sore throats. It is equally well-known that the diphtheria bacillus fastens on the lining membrane of any inflamed or otherwise damaged throat. In this way it seems probable that persons dwelling in an unwholesome environment will be specially prone to an invasion of diphtheria if once brought into their neighbourhood. For my own part, I do not believe that the poison of diphtheria is likely to be conveyed by drains.

(e) *Social Influences*.—This street, a blind alley, with its closely-packed population, forms a sort of colony, where a good deal of social intimacy prevails. During the earlier stages of the outbreak I learned that patients were visited freely by neighbours, and that funerals became the subject of special gatherings in the houses of the mourners. It is hardly necessary to point out how such conditions would favour the spread of infection.

GENERAL CONCLUSION AS TO CAUSE.

By a process of exclusion, I am led to believe that the epidemic in Cornbury Street was due to direct infection from the original case at No. 41, which was in turn infected by some outside source. That being the case, it will be well to inquire why, in spite of the measures for staying the outbreak, its spread to thirteen individuals, and lasted over several months.

The chief measures by which diphtheria is to be controlled are prompt isolation and thorough disinfection. Isolation, however, cannot be effected until the disease is recognised; and the question of early diagnosis becomes of first importance.

Early diagnosis can now be obtained in all cases by bacteriological examination, and this may with advantage be provided for by the local sanitary authority, as in St. Marylebone and other places.

Isolation.—Amongst a crowded and poor population, I believe the only really efficient course is the prompt removal of almost every diphtheritic patient to the hospitals. No one having any practical experience of the sick poor can deny the impossibility of efficiently isolating—to say nothing of treating—patients living in houses like those in Cornbury Street. With regard to this question, it is especially noteworthy that the two original cases were refused admission into the Asylums Board Hospitals, notwithstanding the fact that a daily request—both by word of mouth and in writing—was made to the Central Office of the Board. This failure on the part of the Asylums Board was especially prominent during the early period of the outbreak—that is to say, in its most important stage.

Disinfection.—Owing to the build of houses in Cornbury Street, and to the fact of the families of the infected patients having no rooms to go to pending the disinfection of their homes, this necessary process was carried out imperfectly.

The disinfection of rooms, whether by means of

sulphur dioxide or by a spray of corrosive sublimate or other chemical, should, I believe, in all cases be followed by a free perfusion of fresh air—that is to say, if thorough efficiency be desired.

This outbreak, in my opinion, emphasises the want of a reception house for families of infected patients, and of a house-to-house inspection of the parish. It also illustrates once more the shortcomings of the Metropolitan Asylums Board in the provision of adequate accommodation for this poverty-stricken district.

ANALYTICAL NOTES.

THE use of preservatives in milk and butter has increased very largely during the last few years, in fact, during the summer months the practice of adding a preservative to milk may be said to be general. The preservative which finds most favour with the milk trade, is that known as "Formaline," a more or less strong solution of formaldehyde. Boric acid, borax, or a mixture of the two, are occasionally used for milk, and very largely for butter. From the public health point of view, this question of the addition of preservatives is most important. Whether or not such substances, in the quantities usually added to food, are injurious to health is still considered to be unsettled; but there can be no doubt that under the Sale of Food Drugs Acts, the purchaser has a right to demand that the articles so doctored shall be labelled as containing a foreign ingredient.

For detecting "Boric Preservatives" in milk, a quick and delicate test is to take a small quantity of the milk in a porcelain crucible lid and add a few drops of a five per cent. solution of turmeric to it, followed by two drops of hydrochloric acid. On evaporating to dryness a pink coloration is developed. On allowing the lid to cool, and moistening the stain with a few drops of weak potassium hydrate solution, the pink stain is turned bluish black in colour.

If "Boric Preservative" has been added to butter it can be detected by keeping a little of the butter melted in a small beaker in the water-oven until the water present has settled to the bottom, now decant off as much of the fat as possible, from the aqueous layer beneath, put the beaker on one side until the fat has set. By breaking the fat layer, the aqueous solution can be poured off into a porcelain crucible lid, and treated with turmeric, hydrochloric acid, etc., as above, for milk.

A very delicate method for detecting "Formaline" in milk is O. Hehner's test, which consists in diluting the milk with its own volume of water, and carefully floating it over a little concentrated sul-