TYPHOID FEVER:* ITS NATURE, MODE OF SPREADING, AND PREVENTION.

WILLIAM BUDD, M. D., F. R. S.,

(Published in 1873.)

There are few things which concern the people of this country more deeply than to know the exact truth touching the mode in which this fatal fever is disseminated amongst them. Every year, on an average—take the United Kingdom through—some fifteen thousand or more of their number perish prematurely by it: a population equal to that of a considerable city every year swept into the grave by a single, and, as I hope to show, a perfectly preventable plague.

Perhaps there are few battles to be fought, in which a successful issue depends so closely as here on a real knowledge of the enemy. That typhoid fever is a true member of this group, or in other words, that it is, in its essence, a contagious or self-propagating fever, was proved long ago. It is scarcely to the credit of the medical profession that this great truth should be still disputed. But, not withstanding this, there is abundant reason to believe that, in respect of this species of fever, the great majority, not of the laity only, but of the profession also, still remain anti-contagionists. And this, moreover, is not only true of the rank and file, but distinguished men, who have gained great credit and wide acceptance as teachers of medical science, are to be found, who appear to lean to the same side.

For the development of this fever a more specific element was needed than either the swine, the dung-heaps, or the privies were, in the common course of things, able to furnish.

In the course of time, as was, indeed, pretty sure to happen, this element was added, and it was then found that the conditions which had been without power to *generate* fever, had but too great power in promoting its spread when once the germ of fever had been introduced.

On the 11th July, 1839, a first case of typhoid fever occurred in a poor and crowded dwelling. Before the beginning of November, in the same year, more than eighty of the inhabitants had suffered from it under my care.

Now I need scarcely add, that of the various properties that can be shown to belong to any given malady, this one, of all others, is incomparably the most important. In the first place, it is clear that, in a far higher sense than can possibly attach to any other conceivable property, this mode of propagation sets upon a disease the stamp of a specific nature. In order to appreciate its full significance in this respect, we must not forget that, like the other contagious fevers, this fever, in particular, not only propagates itself, but, if common observation can be trusted in such a matter, propagates no other kind.

What we actually *see* in smallpox—in the typical member of the group—is but a picture of what occurs in the rest. In typhoid fever, as in smallpox, it is the act of growth (with all that is incident to it) that kills; that constitutes the disease, in fact; and where the conditions for this growth are wanting, the poison is powerless. Whether in this fever the scale of reproduction be as vast as in smallpox, we have not the same ocular means of judging; but that it is the same in kind, and immense in degree, the whole history and evolution of the disorder proves.

The living human body, therefore, is the soil in which this specific poison breeds and multiplies; and that most specific of processes which constitutes the fever itself is the process by which the multiplication is effected.

This is what contagion in typhoid fever really implies, and it is thus that provision is made for the perpetuation of the malady.

Now, I have no difficulty in at once giving my opinion that *all* the emanations from the sick are in a certain degree infectious. At the same time, it is one of the principal objects of this work to show that what is cast off from the intestine is incomparably more virulent than anything else.

These discharges contain matters on which the fever poison has set its seal in the most consummate fashion. Wherever they travel—wherever their exhalations penetrate—there, at least, the most specific of all the exuviæ from the sick body are in operation. The sewer, which is their

* This is the second of a series of extracts from classic public health literature selected by Prof. C. M. Hilliard.

common receptacle, is, so to speak, the direct continuation of the diseased intestine.

Take the diseased intestine away, and it becomes impossible, in a common outward survey, at least, to distinguish the body of a man dead of typhoid fever, from that of a man killed by many another septic poison; take away the body, but leave the intestine and by the marks upon it, death from this fever is, at once distinguished from death from every other cause.

The second great point to which, before I conclude this chapter, I wish for the moment to draw attention, is, that the excreta to which all these fatal prerogatives are assigned, are on their issue from the body, entirely within our power. I shall show, in the course of these pages, that by placing a sufficient measure of a caustic solution of chloride of zinc, or an equivalent quantity of any other powerful disinfectant in the night-pan before it is used by the fever patient, the intestinal discharges may be entirely deprived of their contagious powers.

To insure the universal adoption of a measure even so simple as this, would, however, require a degree of coöperation amongst medical men, and a degree of zeal and intelligence on the part of attendants of the sick, which at present, at least, I fear we have no title to expect. At present, the great bulk of what escapes from the intestines of fever patients in this and other countries, is, too often, let loose upon society without the slightest precaution being taken, and we see with what results. I trust the time is not far distant when to allow these matters to pass into the cesspool or sewer in full possession of their deadly powers will be looked upon, not merely as a careless but as a highly culpable act.

One mode of communication has attracted little attention, which it is important, nevertheless, not to overlook; I speak of the tainted hands of those who wait on the sick. Among the poor, and in ways that will suggest themselves, and need not be more particularly described, there is reason to believe that this mode often has a large share in spreading the disease through the family circle. Passing from the hands to other things under contingencies that are not only very conceivable, but are sure now and then to occur, the contagion thus arising may sometimes have a much wider scope. I possess evidence which renders it in the highest degree probable, that milk and butter, especially, may become infected in this way.

Linen, wearing apparel, bedding, and other porous fabrics, tainted with fever, constitute another important form of vehicle. But the propagation of typhoid fever on a large scale, and down through the ages, is effected through other media. We have already seen that the bulk of the poison by which the succession is kept up, is cast off by the intestine in a liquid form. The first effect is, therefore, as I have before said to infect the ground.

Obviously, there are two *principal* ways, and only two, in which a poison cast out upon the ground can find its way back again into the living organism. Either through the drinking water, or by emanations borne upon the air.

In the course of this work, I have already had occasion to speak of disinfection as the one great means whereby the spread of typhoid fever may be prevented.

In carrying out this system of prevention, two great principles should be kept in view. The first is to be lavish in the use of the chemicals rather than to run the terrible risk of failing by default; the second, that whatever be done should be done in that thorough and conscientious way which alone befits acts that may issue in health or disease, in life or death, to indefinite numbers of men. But no preventive scheme would be complete which did not provide against those in which the fever remains, for a longer or shorter time, undetected. I have already shown how the occurrence in school-children of that type of fever, which the French call *la fièvre typhoïde ambulante*, may become the means of spreading the disease widely through a school, and thence through a large community.

Of the permanent sanitary works, by which the spread of typhoid fever may be hindered, this is not the place to speak. The business of designing and executing these works belongs not to the physician, but to the engineer. Their chief object is to prevent the drinking water, as well as the air of the inhabited area, from becoming contaminated by human excreta. As regards the water, we know how this may be effected, and the question is one of expense only. But as regards the air, great improvements must be made in our systems of drainage to enable us safely to dispense with the disinfecting measures detailed in the present chapter.

The need of some radical modification in the view commonly taken of the relation which subsists between typhoid fever and sewage was placed in a very striking light by the state of the public health in London, during the hot months of 1858 and 1859, when the Thames stank so badly.

The results we all know. Stench so foul, we may well believe, had never before ascended to pollute this lower air. Never before, at least, had a stink risen to the height of an historic event. Even ancient fable failed to furnish figures adequate to convey a conception of its thrice Augean foulness. For many weeks, the atmosphere of Parlimentary committee-rooms was only rendered barely tolerable by the suspension before every window of blinds saturated with chloride of lime, and by the lavish use of this and other disinfectants. More than once, in spite of similar precautions, the law-courts were suddenly broken up by an insupportable invasion of noxious vapour. The river steamers lost their accustomed traffic, and travelers, pressed for time, often made a circuit of many miles rather than cross one of the city bridges.

With the popular views as to the connection between epidemic disease and putrescent gases, this state of things naturally gave rise to the worst forebodings. Members of Parliament and noble lords, dabblers in sanitary science, vied with professional sanitarians in predicting pestilence. If London should happen to be spared the cholera, decimation by fever was, at least, a certainty. Meanwhile, the hot weather passed away; the returns of sickness and mortality were made up, and, strange to relate, the results showed, not only a death-rate below the average, but, *as the leading peculiarity of the season*, a remarkable diminution in the prevalence of fever, diarrhea, and the other forms of disease commonly ascribed to putrid emanations. So that, while pythogenic compounds were poisoning the air with what may be called a forty thousand fever-power, the so-called pythogenic fever, so far from rising in proportion, fell much below its average.

While, therefore, the great fact remains that sewers are the principal channels through which this fever is propagated, the proof from all sides is overwhelming that they are so not because of their being receptacles of decomposing organic matter, but solely to their being the depositaries of the specific discharges of persons already infected.

The theory, in its entirety, is not only simple and harmonious, but it is in strict accordance with what we already know of a certainty of other members of the same family group.

Above all, its truth may be tested every day by a practical test, the employment of which can do no harm, and may do incalculable good.

Here I might fitly conclude. With this last step, as all may see—Science passes into Duty.

C. M. H.

ASSOCIATION NEWS

By the Secretary, A. W. Hedrich.

HELP WANTED.

In order to help relieve the shortage of sanitarians due to the war, free help-wanted announcements will be carried in this column until further notice. Copy goes to the printer on the first of each month. In answering keyed advertisements, please mail replies separately.

The Health Employment Bureau also sends lists of applicants to prospective employers without charge.

Wanted: A woman bacteriologist, or a man who is not subject to draft, to carry on research work in bacteriology on the flora of the mouth and study of a formula for dentifrice, with a Connecticut company. Address No. 143, C. K. T., care of this Journal.

Wanted: Professor of bacteriology and pathology in a western university and ex-officio director of state public health laboratories. Should be M. D. or D. P. H. Salary, $3,000 per year with prospects of advance. Address No. 144, F. E. H., care of this Journal.

Wanted: Assistants in public health work in western state to take charge of branch labora-