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“How to Escape Typhoid Fever.”

A LECTURE

Delivered under the auspices of

THE AUSTRALIAN HEALTH SOCIETY,

by

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PRICE SIXPENCE.
"SALUS POPULI SUPREMA LEX."

"I might present examples of more correct appliance of the principles of sanitation, where the death rate of cities and towns has been reduced more than half, with a corresponding gain in life and money, and I might adduce examples of the total abolition of the so-called children's diseases and a reduction to one-third of children's ordinary death rates."

SIR EDWIN CHADWICK.

"With as yet very rudimentary and imperfect executive arrangements, the mean duration of life of all your Majesty's subjects has already been augmented by three and a half years, the death rate in your army has been reduced one-half, and, on the last year's population of England and Wales, there has been a saving of 84,000 cases of death and 1,700,000 cases of illness."

ADDRESS TO THE QUEEN BY THE SANITARY INSPECTORS OF ENGLAND.
FROM the sanitary point of view this community of ours is in a state of perilous siege, and one of the most active of its besiegers is Typhoid Fever. Of the truth of this now terrible commonplace we are most of us more or less painfully conscious, but for purposes of exact description it will be well to read over some of the latest official returns from the field of battle.

5159 cases of Typhoid Fever reported in Victoria from December, 1888, to May, 1889, with 789 deaths.

2363 cases of Typhoid Fever reported in Melbourne from January, 1890, to June, 1890, with 249 deaths.

Nor is this siege at an end. We stand at present face to face with the practical certainty that before this day twelvemonth, unless something happens which has never happened before, thousands of individuals now amongst us in the glow of health and in the prime of life will have been taken prisoners, and hundreds of others will have been killed outright by the same unscrupulous invader.

Such a state of matters is nothing less than a national calamity, and amongst the many questions of the day which press for settlement few are more important than that of ‘‘How to Escape Typhoid Fever.’’ To ignore it means to place individuals and families entirely at the mercy of a merciless foe. But, you will ask, can any practical and satisfactory answer be given to
such a question? It will be the aim of this paper to show that there can, and to suggest the means.

How have matters come to their present pass? The record is both significant and instructive. Typhoid Fever is a germ disease. The fittest habitat of the germ is the human bowel, and, once introduced it is with the bowel contents that the germs are voided to produce fresh cases of disease. It has been estimated that even before the year 1876 some 50,000 cases of Typhoid Fever had occurred within Victoria generally, and that of these some 3000 had been treated in the Melbourne Hospital. Year by year the roll has been swelling, until the number has reached the dimensions of the returns already quoted.

But, dismissing statistics, let us turn to the important point therein involved, and ask the pertinent question—"What have we been doing all this time with the carriers of infection—the Typhoid-bearing excreta?" The answer is simple, and, at the same time, explanatory of the extent of the plague. We have all—individuals, city, town, and borough councillors, hospital committees, and boards of health—been actively concerned in assisting in their dissemination. Think of the leakages and pollution from innumerable closets used by Typhoid patients, of the Typhoid excreta washed into miles of gutters, buried in hundreds of back yards, spilt upon scores of open roads, and trenched into acre after acre of open ground on every side of the city; and remember that in
thousands of instances, millions of Typhoid germs have thus been set free to live and multiply at the expense of human lives. In the nights of our ignorance this fatal mistake might well have been deemed unavoidable and passed over without further comment, but what can excuse its continuance in every suburb in the present light of day? The result—the inevitable result—has been that, in addition to the thousands who have fallen victims to the disease, our soil almost everywhere has become polluted, and in no part of our metropolis, at least, is air or water free from imminent danger of similar contamination.

But follow the further history of these germs that ignorance and apathy have liberated for our destruction.

Their commonest destination has ever been the land. In the past six months, and in the metropolitan area alone, it has received the Typhoid excreta of some 2000 people. There, within a few feet of the surface, these germs have been provided with admirable winter quarters. Summer comes, with its surface drying, and autumn follows, wherein subjacent strata reach their highest temperature; and wherever Typhoid excreta have been deposited, there will be Typhoid spores commingled with the dust, to be borne, like it, anywhere, everywhere, at the mercy of the wind. Remember, it is almost entirely in the spore, and not in the bacillary stage, that this diffusion occurs; and, as we shall see, this
distinction is of vital importance from the preventative point of view.

Follow them now in their flight through air. From all parts of our metropolis to all other parts, according to the direction of the winds, these Typhoid spores must be blown throughout our summer and autumn, to enter the bacillary stage, to live and multiply wherever they find water and nourishment. These necessaries are present in all surface waters and in all damp filth; and so thoroughly insanitary have we made the metropolitan area that it may be confidently asserted that there are few perches within our suburbs where such niduses do not abound in some form or another. Indeed, Dr. Gresswell's official report makes us doubt whether there can be many yards of exposed surface which are not prepared for infection. Spouting and guttering, also, must furnish many oases to germs which would otherwise perish; and, as we know theoretically, yet continue to ignore practically, from spouting they pass into tanks, and from gutters they find their way into our Yan Yean water pipes. Thousands of germs must thus find all they need for self-preservation and multiplication. Millions of others, less fortunate, no doubt come to a more or less untimely end.

Numbers, again, must undoubtedly be blown into the human nose and throat, and the question immediately arises, "Is it thus that we get our attacks of Typhoid Fever?" There are few, if
any, facts in favour of such as the mode of attack, and there are many good reasons for believing that Typhoid Fever in man is not so produced. For example, the spores which are air-borne are almost motionless. They lack the boring movements suggestive of penetration so characteristic of the bacilli; they require a proper medium for their cultivation, and a definite period for their incubation. Even under the safeguards of a laboratory their life is precarious. Hence, though they secure an entrance, it is improbable that they gain a foothold, and it is more likely that such as enter pass out again still in the spore state. Further, that the germs are not aerially infective is borne out by many other considerations. For example, Typhoid Fever is not contagious, as Scarlatina and Measles are. Though it attacks mainly adults, it does not spread in the wards of a general hospital. Students, though of a susceptible age, do not contract it in making post-mortem examinations of persons dying therefrom. Again, the local injury produced is not in the respiratory tract, nor are the complications those of the lungs and chest, as in the case of the air-borne epidemics. On the contrary, the local injury is in the alimentary canal, and the complications are of the abdominal organs. Hence, all authorities are practically agreed in disregarding the atmosphere as the main or even the common medium of infection in Typhoid Fever; and, as we shall see, almost all epidemics have been attributed to other agency.
What is this agency? This is the all-important question for the individual to answer, for in it is bound up the means of escape from attack. Here are millions upon millions of Typhoid germs in our soil, contaminating everything by means of their spores. Within a few feet are thousands of human beings violently attacked. If attack is not through the air, how do the germs enter the system? The only answer possible is—with articles of food and drink. Nor is this conclusion at variance with experience, for upon this point, if upon any, the testimony of authorities is unanimous.

Let us, then, look carefully into this vital question of the contamination of articles of food and drink in so far as our metropolis is concerned. If you still ask, how does this contamination occur, an unpleasant surprise awaits you.

Take, first, our Yan Yean water supply. It is twelve months since my friend M. de Bavay first showed how Typhoid contamination of local water supply was only too possible through fire-plugs improperly placed and wrongly constructed, backing up his statement by the discovery of germs indistinguishable from Typhoid in various parts of the reticulation. The fact was partly admitted, though its tremendous significance was almost completely ignored, so that only some 600 fire-plugs were removed to less dangerous, but still insecure, positions, leaving, mirabile dictu, some 19,400 just as and where they were. Even this slight alteration, however, has, as shown by
statistics, been followed by a decrease in the number of cases. And now we find the medical adviser to the Board of Health, in his report upon the sanitary state of the metropolis, giving exactly the same advice, emphasising exactly the same danger, and pointing out a further source of contamination almost everywhere present in the form of local subsoil imperfections in the pipes themselves. Thus the case against our local high pressure water supply could scarcely be stronger, unless we drained our closets directly therein.

Take, again, our rain water. Scattered everywhere, rain water tanks seem most frequent near the present or past site of market gardens. Wherever situated, however, it must be a question mainly for mathematicians to decide what proportion of Typhoid spores lodge on roofs and spouting and are washed into the receiving tanks. Strange to say, no proper examination of tank water has yet been made, though its necessity has been frequently insisted upon, and though, in addition to the foregoing probability of infection, we have had numerous illustrations of epidemics of Typhoid Fever which correspond exactly with the needs of this hypothesis. Similarly, with regard to underground tanks, there is the same danger of infection from the roofs, with an added risk from surface soakage, and another from subsoil percolation. Here, further, M. de Bavay has recently isolated numbers of germs, apparently Typhoid, from a country tank
in a house wherein several cases of Typhoid Fever had occurred in a mysterious manner.

Turning next to milk, we find the same facility of infection, with even greater possibilities of multiplication. Read Dr. Gresswell’s description of the insanitary state of most, if not all, of our dairies, and remember that they are generally surrounded by open lands, upon which Typhoid excreta has been, or is being, trenched. Infection with Typhoid germs thus becomes more than possible even during the collection of the milk. Again, the cans themselves are daily washed in waters liable to similar pollution, and the milk itself is frequently left to stand in unprotected places for a considerable length of time. Further, milk is an almost ideal medium for the growth of the Typhoid germs. Thus they will remain in new milk until it becomes acid, and for 35 days even after it turns sour, and, as I have seen in M. de Bavay’s laboratory, they may abound in the milk without the production of any visible change.

Similarly with many other articles of food. Fruit and vegetables are generally grown on more or less Typhoid soils and frequently reared in a perfect atmosphere of spores, whilst food of most kinds is liable to infection by infected air during transit, and, in certain limited cases, by flies bearing germs from neighbouring Typhoid excreta. Nor do the germs die at once when so deposited. On the contrary, it has been found in butter, for example, that their vitality
lasted for three weeks, whilst they remained alive for some three days in natural cheese and whey.

There can be no doubt, therefore, of the possibility, and even of the actual fact, of the infection of many of our articles of food and drink during the Typhoid season. Such infection will indeed be the rule rather than the exception. We must not, however, run away with the idea that an attack of Typhoid Fever necessarily follows the eating or drinking of infected articles. Were that indeed so, it is probable that few of us would escape. Fortunately, an attack requires, in addition, the entrance of a sufficient dose of the germs, their successfully running the gauntlet of the stomach, their lodgment in the bowel, and their victory in the sharp local fight which then ensues. Further, age almost confers immunity, for we find, whatever be the reason for it, that by far the majority of cases occur between the ages of 15 and 35.

We are now able to face the question which we seek to answer—“How to Escape Typhoid Fever.” Certainly, if we could prevent the contamination of articles of food and drink, we should be able to prevent epidemics of Typhoid Fever. But see what this involves. We must stop supplying the earth with fresh relays of germs. This will necessitate the immediate establishment of a separate service for the proper disinfection and removal of all Typhoid excreta, and their prompt destruction by fire, a reform towards which
steps are but slowly being taken in but a few municipalities. Again, we must deal effectively with the germs almost everywhere present in surface and subsoil. This will require a complete alteration in the present household and municipal method of practically ignoring the continuance of stagnant waters and filth heaps here, there and everywhere, and the introduction of a system of subsoil drainage and sewerage such as that recommended by Mr. Mansergh. It will mean, also, a thorough change in the present perfunctory manner in which sanitary inspection is entrusted to incompetent or apathetic hands, the practical awakening of the Water Supply Department to the dangers of continuing to permit the impurity and pollution of our water supply, and some better arrangement than at present exists for the delivery of pure and even of sterilised milk. Much of all this is possible, much must continue imperfect, and all will take years before it is in actual operation.

Meantime, what is the individual to do who wishes to make some real attempt to avoid attack? Certainly he must secure what is practical in the above, and continue to strive after what still remains to be gained. He will assuredly see to it that no stagnant waters collect about his premises; that there is a dust bin in which to place all household refuse; that his house drains are perfect, disconnected, and with a proper fall; that his house is built upon a sanitary site; that his closet is as far as possible away from the house,
with a properly fitting and ventilated pan, with the underground free from pollution, deodorants freely used, and removal both regularly and efficiently performed. And, remembering that he shares the air, water, and soil with his neighbours, he must do his best to induce the local authorities to attend to surface conservancy, proper guttering, efficient drainage, and proper removal of all excreta, but especially Typhoid excreta, and to the prevention of infringement of sanitary bye-laws, and the removal of nuisances and dangers to health.

But though he do all this ever so wisely and enthusiastically, a supply of Typhoid germs will still, for years to come, find their way into his articles of food and drink in sufficient quantity to render his chance of immunity from attack an exceedingly slight one. What, then, must he do? Must he calmly fold his hands and take his chance? It is almost incredible, in the face of our present knowledge, and in view of the seriousness of the situation, to have to say that, as far as all his authorities are concerned, he has hitherto been practically left to believe that he must.

It is now more than three years since I first ventured to draw public attention to this fundamental matter. I then wrote that, if it were possible, it would be worth while to make the national experiment during the Typhoid season of avoiding uncooked vegetables, of boiling all milk,
and of boiling or filtering all water before use. Some few individuals made the trial, and, in no case within my knowledge, have their families been since attacked by Typhoid Fever. When, twelve months ago, M. de Bavay publicly notified his discovery of Typhoid germs in our water supply, and showed how general such contaminations must almost certainly be, I felt it still more imperative upon me to reiterate the value of such precautions, and brought the matter directly under the notice of the public, as well as of most if not all of our local sanitary authorities. Feeling that it would advance matters to have the corroboration of those qualified to speak, I raised the question before the Sanitary Section of the Australasian Association for the Advancement of Science at its meeting last January, when a resolution was passed to the effect that the adoption of such precautions would very materially lessen the risk of individual infection, and that a copy of this and other resolutions dealing with general preventative measures should be forwarded to every sanitary authority throughout the Colonies. Still feeling that to make it effective on a large scale this resolution required the sanction and support of the central authorities, I made it my business to interview such authorities, and nine months ago received a promise that steps would be taken to notify the public accordingly. I sincerely hope that that promise will be fulfilled before the commencement of the coming Typhoid season.
In my opinion the matter is of such importance that too great publicity cannot be given to it. I should like to see the Board of Health take such steps that not only would the matter be brought prominently under the notice of all the officers of the local boards, but that the public also should directly receive official notification in the form of proclamation, circular, or leaflet, in such a manner that no individual of susceptible age within fairly-inhabited areas could any longer remain ignorant of its recommendation. It would then be possible for individuals to act in accord with its suggestions or to neglect them if they thought fit, whilst at present almost all are left in complete ignorance of the facts of the case. Further, that mighty organ, the Press, might help enormously by giving the fullest publicity to their circulars.

And what, it may be finally asked, would be the nature of their recommendations? I think they might be summarised somewhat as follows:—

HOW TO ESCAPE TYPHOID FEVER.

1. Keep the surroundings of your house dry and clean, and so make it difficult for Typhoid germs to live near you.

2. Protect all articles of Food and Drink as much as possible from exposure to infection. Remember that the germs may be carried to them through the air, as well as by flies, especially when Typhoid excreta are near at hand.
3. Thoroughly cleanse all Fruit and Vegetables before use, and avoid altogether uncooked vegetables such as lettuce, watercress, &c.

4. Be most careful to boil or scald all Milk before use.

5. In the case of Drinking Water, either boil or filter, or, where the water can be stored for twenty-four hours, add quicklime. If boiling, boil as for "tea," or, if to be used alone, boil for half an hour, drinking only the upper portion on cooling. If filtering, use a Pasteur or a Jeffrey filter (the ordinary filters are powerless against the passage of Typhoid germs), and cleanse the filter at least once a week. If storing the water, add the quicklime in the proportion of eight grains to the gallon, and, if possible, filter through an ordinary dripstone filter afterwards.

Personally I am of opinion that, if these precautions were to be generally followed, considerably more than three-fourths of our Typhoid Fever would immediately vanish, and that the individual who carefully and consistently carried them out would be almost sure to escape infection. And when authorities are agreed that the risk of individual attack may thus be most materially reduced, and when a Government proclamation is deemed advisable to meet the possibilities of a great and extended strike, surely a somewhat similar course of action cannot with reason be neglected when the whole community is actually face to face with an enemy which is otherwise certain to slay its thousands.