

MEDICINE

Contagion of Typhoid Fever

"A Classic of Science"

In 1839 Dr. Budd Solved the Mystery of Typhoid Fever By Mapping the Spread of an Epidemic from Case to Case

ON INTESTINAL FEVER: ITS MODE OF PROPAGATION. By William Budd, M. D. In *The Lancet*, London, Dec. 27, 1856.

THERE are few things in which the people of this country have a deeper concern than in knowing the real truth in what relates to the mode in which this fatal disorder is disseminated amongst them. Every year, on an average, some twenty thousand British souls perish miserably by it, and disasters, which, occurring in the army of the Crimea, made the nation shudder, occur annually in the peaceful, working, army at home, without giving the nation a thought. As for one who dies of this fever there is reason to believe five or six recover, some 100,000 or more of our people must every year pass through its protracted miseries. The real amount of human suffering involved in this is, however, but feebly represented by mere arithmetic. No one can know what these figures really imply who has not had experience of this disorder in his own home. The dreary and painful night-watches, the unusual length of the period over which the anxiety is protracted, the long suspense between hope and fear, and the large proportion of cases in which hope is disappointed and the worst fear is at last realized, make up a sum of distress that is happily scarcely to be found again in the history of any other acute disorder. Even in the highest class of society the introduction of this fever into the family is an event that, in most cases, long stands out in relief in the record of family afflictions. But if this be true in the houses of the rich who have every means of alleviation which wealth can command, how much more true must it be in the cottages of the poor, who have scant provision even for the necessities of life, and none for its great emergencies? Here, when fever once enters, want soon follows, and contagion is not slow to add its peculiar bitterness to the

trial. As the disease is by far most fatal to persons in the prime of life, the father or mother, or both, are the first to perish when death ensues, and the young survivors being left without support, their home is broken up, and their destitution becomes complete. How often have I not seen in past days, in the single narrow chamber of the workman's cottage, the father lying in the coffin, the mother in the sick bed in muttering delirium, and nothing to relieve the desolation of the children but the devotion of some poor neighbor, who too often paid the penalty of her kindness in becoming herself a victim of the same disorder. In its ordinary course human life has few such consummations of misery as this. It is impossible to contemplate events such as these merely as objects of science. It is, indeed, a fundamental axiom in scientific investigation, that our emotions should be rigidly excluded from it. But although by the nature of things they cannot help in the solution of a problem, they may at least be suffered to give a spur to inquiry. Where the interests concerned are the sacred and unspeakable interests of life and death,

this is their proper function, and that in a degree of which none of the common alternatives which hang upon human duty can give any real measure. It were well for us all if they were oftener allowed to have their true weight with the conscience. Having been by accident thrown much in the way of this fever, I have long felt that it is impossible to bear a part in the calamities of which it is the source, without becoming possessed by a burning desire to devote the best powers of the mind to discover means, if such there should haply be, by which such calamities may be prevented. From the fact already referred to, of its being so much more deadly to grown-up persons, this disease has a relation to pauperism which is peculiar to itself. In this fever the workhouse finds its chief purveyor.

5634 Deaths

"From returns made in 1838 by the medical officers of twenty unions and parishes in the metropolis, it appeared that 13,972 cases of claims to relief, on the ground of destitution, were created during that year by attacks of fever alone; and that in 1281 cases the attacks proved fatal. The general deaths from fever in the metropolis during that year appear, from the summary of the Superintendent Registrar's returns, to have been 5634."—(Letter from the

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THE NEXT CLASSIC OF SCIENCE

Poor-law Commissioners to the Metropolitan Board of Guardians, Nov. 1840).

One of the most interesting of the many writers who have dwelt on this point expresses himself in the following words:—

"A fever which consigns thousands to the grave consigns tens of thousands to a worse fate, for fever cuts off the parents, leaving the wretched offspring to fill the future ranks of prostitution, mendicancy, and crime."

It is humiliating to think that issues such as these should be contingent on the powers of an agent so low in the scale of created things, that the mildew which springs up on decaying wood must be considered high in comparison. To know how these powers take effect, in what way they grow to such a height, and to learn therefrom, perchance, by what means their operation may be defeated, are problems in which human happiness is deeply interested. 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. If it be true of disease in general that all prevention must be based on an intimate acquaintance with their causes, it is still more true of that great group of diseases which are the work of definite and specific agents, having not only the power of subsisting within the body, but capable, for limited periods at least, of existing externally to it. For it is clear that in such a case a thing against which we may be powerless, so long as it infects the body itself, may present, on its issue from the body, the conditions of an easy conquest.

That the specific form of fever which is attended with a specific disease of the intestinal follicles is a true member of this group may be very easily proved.

In saying, in the number of The Lancet for December 6th, that this fever is a *contagious* fever, I was well aware that I was making an assertion to which

the great weight of medical opinion in this country is directly opposed. Not to speak of minor notabilities, the whole *prestige* of the Board of Health, and of the London Royal College of Physicians, may be cited against it. To make unceasing and implacable war against contagion and contagionists seemed with the former, indeed, to be, for some years, the chief purpose of its existence. And although many important changes have lately occurred in its staff, there is still abundant evidence that in dealing with this and kindred questions this Board is unable to shake off its old traditions . . .

Site of the Epidemic

Seventeen years ago, while engaged in country practice in Devonshire, outbreaks of this species of fever repeatedly fell under my eye, under conditions singularly favourable for the study of its mode of propagation. Of these outbreaks, the most memorable occurred in the village of North Tawton, in which I then lived. In addition to the advantages enjoyed by country practitioners generally, in the observation of such events, there were others peculiar to the position I then occupied. Having been born and brought up in

the village, I was personally acquainted with every inhabitant of it; and being, as a medical practitioner, in almost exclusive possession of the field, nearly everyone who fell ill, not only in the village itself, but over a large area around it, came immediately under my care. For tracing the part of personal intercourse in propagating disease, better outlook has rarely fallen to the lot of an observer.

At the date of the outbreak in question, the people of the place numbered some 1300 souls. Of these a small minority, consisting chiefly of women and children, worked in a serge factory; the rest were employed in agricultural pursuits. The spot on which this community dwelt is richly endowed with all the natural conditions of health. Built on a dry soil, in the midst of an open and well-drained country, and occupying the side of a hill sloping gently to the northwest, this village had been long and justly noted in that part of Devon, for the rare healthiness of its site. What is more to the present purpose is, that it had for many years enjoyed an almost entire immunity from the fever to which it was so soon to pay so large a tribute. This is the more to be remarked, because there were, in

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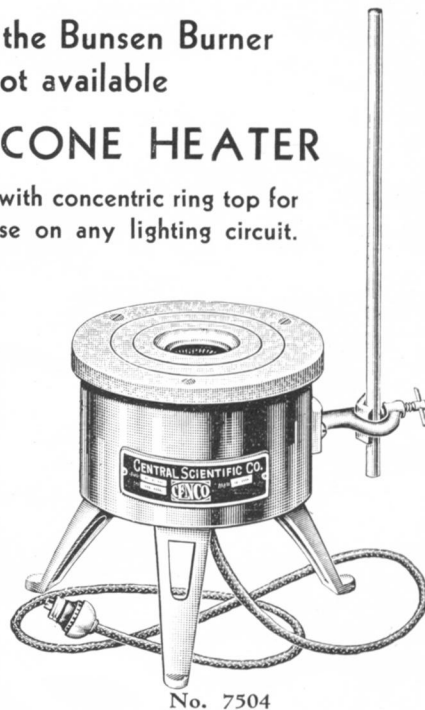
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the economy of the place, and in the habits of the people, many things which, according to modern views, are hard to reconcile with such a fact. In the first place there was no general system of sewers. A few houses, occupied by the more opulent, were provided with covered drains, but all these might be counted on the fingers. In the cottages of the men who earned their bread with their hands, and who formed the great bulk of the inhabitants, there was nothing to separate from the open air the offensive matters which collect around human habitations. Each cottage or group of three or four cottages had its common privy, to which a simple excavation in the ground or an open ditch at hand served as the cesspool. Beside this it was a part of the economy of all who worked in the fields, as indeed of many more, to keep a pig, one of whose functions was to furnish manure for the little plot of potatoes, which fed man and pig alike. Thus, hard by the cottage door, there was often not only an open privy but a dungheap also.*

No Fever

Nevertheless, these things existed for many years without leading to any of the results which it is the fashion to ascribe to them. Much there was, as I can myself testify, that was offensive to the nose, but fever there was none. It could not be said that the atmospheric conditions were wanting, because while this village remained exempt, many neighboring villages had more than once suffered severely from the pest. It could not be said that there were no subjects, for these, as the sequel proved, but too much abounded. Meanwhile, privies and dungheaps continued to exhale ill odours without any specific effect on the public health. Many generations of swine innocently yielded up their lives, but no fever of this or any other sort could be laid to their charge. I ascertained by an inquiry conducted with the most scrupulous care that for fifteen years there had been no severe outbreak of the disorder, and that for nearly ten there had been but a single case. For the development of this fever a more specific element was needed than either the swine, the dungheaps, or the privies, were, in the common course of

*I am happy to say that since the date referred to, a great reform has taken place in many of these things. The town is now drained by a system of well-constructed sewers, and pure water, conveyed in closed pipes from an abundant source about a mile distant, is laid on under high pressure through every part of it. So that, in respect of sanitary conditions, North Tawton is now quite a model of a place. The swine, I am told, remain unmolested.

PSYCHOLOGY

Gasp is Not Usual Response Of Persons Scared by Snake

Blood Pressure Increased and Breathing Rate Changed In Shocking Situation, Psychologists are Informed

A GASP of surprise is not the manner in which a person responds to the sight of a live snake even if it is over six feet in length, Dr. Harold B. Gaskill, of Iowa State College, told the psychologists gathered at Toronto for the recent meeting of the American Psychological Association.

The rate of breathing, however, in such a shocking situation is changed, he stated. Half the persons whom Dr. Gaskill tested breathed much faster than before they received the shock, but with the others the breathing was slowed to an equally conspicuous extent. Blood pressure increases during fear. Heart rate was sometimes increased and sometimes decreased, but half of those tested showed no change.

Dr. Gaskill also found that reading a short story slows both breathing and heart rates.

The curves of the body of a graceful diver resemble mathematically those of an airplane wing, Dr. Coleman R. Griffith of the University of Illinois reported. As the body is curved at the top of the dive, seemingly poised for a fraction of an instant in air, the mathematical formula for the pattern of the human form is very much like that of a wing designed for a slow-moving airplane. When the body straightens out for entrance into the water, the pattern is like that of a high-speed wing.

By the aid of motion pictures of high dives, aerial casting from trapezes, and backward handsprings, Dr. Griffith has studied the differences between the movements of graceful, highly skilled

things, able to furnish. In the course of time—as was, indeed, sure to happen—this element was at length 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. The soil was already prepared; it only required the seed to bring forth the bitter fruit.

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performers, awkward beginners, and persons under the influence of fear. The angles between different parts of the body in the skilled performer change smoothly with the movement. Awkwardness causes too much change in the angles. Fear, because of the accompanying muscular tension, too little.

The saying "there is no accounting for tastes" is disproved by research reported by Dr. Paul T. Young, of the University of Illinois, who has found that food preferences and aversions of experimental animals follow certain definite laws. He is now attempting to find out what these laws are. All the rats studied showed practically the same preferences. Milk stood highest in the list of foods chosen, while flour was the last choice. Some of the foods are chosen to almost the same extent, and in this case the order of preference may shift suddenly. Thus, butter may be preferred to ground wheat one day and the ground wheat chosen the next. But neither is preferred when sugar or fresh milk is available. Rats fed on a diet including cod liver oil tend to place butter toward the bottom of the preferential list.

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ORNITHOLOGY

Deserted Island is Set Aside as Bird Refuge

ST. KILDA, one of the loneliest islands in the world, has been purchased and set aside as a bird refuge, now that its human inhabitants have left. The island lies off the Hebrides on the northwest coast of Scotland.

Until last year it was occupied by a few families, who lived under conditions of the greatest hardship, and were practically cut off from the world most of the year. They were removed to the mainland, where living conditions are a little better, and their old home left only to the great flocks of birds that had shared it with them.

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