

in so many ways that it is appreciated by all. Exact information on the subject in this country is relatively scarce. Enough is known, however, to give a fair idea of its extent. Russell and Hastings give the percentage of infected cattle found in several states by the injection of tuberculin. The percentage varied from 3.9 in Vermont to 50 in Massachusetts. These figures, of course, are not absolute, inasmuch as in no case were all cattle tested and in many only suspected herds were so treated. From the recorded tests of 20,930 head with tuberculin in Great Britain, 5,441, or 26 per cent., were pronounced tuberculous (Salmon).¹⁹

Veranus A. Moore²⁰ states that the reports obtained from practicing veterinarians as to the prevalence of tuberculosis among the cattle in New York show that, "of the 8,640 tested, 3,111, or 36 per cent., reacted (to tuberculin). Of the 364 herds tested, 265, or 72.8 per cent., were infected, leaving but 27.2 per cent. of the herds examined free from this disease." On the other hand, official tests made by the State Commissioner of Agriculture (1903-1906) made on supposedly diseased

culous lesions, and this hypothesis has been the basis on which many have worked. But it has been well demonstrated that this is not a safe basis for action. Schroeder and Cotton have conducted experiments which seem to show that not only do cows with udder lesions secrete tubercle bacilli in milk, but those having no demonstrable lesions, but reacting to tuberculin, may secrete them, and that those with marked lesions in other parts of the body do so frequently. But the question of the secretion of tubercle bacilli in milk is not the only one to be considered, for the same authors have shown that, although milk may be secreted free from bacilli, it may be infected by the feces which contain the organisms because of intestinal lesions or swallowed sputum. The vaginal discharge also at times contains tubercle bacilli. In view of the above, the question as to whether or not tubercle bacilli are secreted in the milk of tuberculous cows without udder lesions is immaterial.

TUBERCLE BACILLI IN MARKET MILK.

With a large percentage of dairy cattle tuberculous we may expect to find tubercle bacilli in market milk and milk products. This has been done frequently, as will be seen from the accompanying tables.

Other diseases in the epidemiology of which milk plays an important part are dysentery, epidemic diarrhea, cholera, Malta fever and milk sickness. The last-named disease has been an unsolved problem until the recent work of Jordan and Harris.²¹

TABLE 2.—TUBERCLE BACILLI IN MARKET BUTTER.

Author.	Year.	Place.	Butter Samples Examined.	Tubercle Bacilli Found in.	Per Cent. Containing Tub. Bac.
(A) Brusafarro . . .	1890	Turin.	9	1	11.1
(A) Roth	1894	Zürich.	20	1	5.
(A) Obermüller . . .	1895	Berlin.	14	14	100.
(A) Schuchardt . . .	1896	Marburg.	42	1 (?)	2.4
(A) Groning	1897	Hamburg.	17	8	47.
(A) Petri	1897	Berlin.	102	33	32.3
(A) Rabinowitsch . . .	1897	Berlin.	36	0	0
(A) Rabinowitsch . . .	....	Philadelphia.	50	0	0
(A) Hormann and Morgenroth . . .	1898	Berlin.	10	3	30
(A) Rabinowitsch . . .	1899	Berlin.	15	2	13.3
(A) Ascher	1899	Königsberg.	27	2	7.4
(A) Jäger	1899	Königsberg.	3	1	33.3
(A) Coggi	1899	Malland.	94	2	2.12
(A) Korn	1899	Freiburg.	17	4	23.5
(A) Weissenfeld . . .	1899	Bonn.	32	3	9.36
(A) Obermüller . . .	1900	Berlin.	10	7	70.
(A) Bonhoff	1900	Marburg.	28	0	0
(A) Herbert	1900	Württemberg.	100	0	0
(A) Herbert	1900	Berlin.	20	0	0
(A) Herbert	1900	München.	5	0	0
(A) Markl	1901	Wien.	43	0	0
(A) Herr u. Beninde . .	1901	Breslau.	45	7	15.5
(A) Gehrke-Löffler . .	1902	Greifswald.	8	7	88.
(A) Gehrke-Löffler . .	....	Greifswald.	17	1	6.
(A) Aujeszky	1902	Budapest.	17	3	17.6
(B) Hellström . . . . .	....	.....	12	1	8.
Total . . . . .	....	.....	787	101	12.8

(A) Corner: Die Tuberkulose, 1907, pp. 122-123.

(B) Swithinbank and Newman: Bacteriology of Milk, p. 221.

herds "revealed a much smaller percentage of diseased animals and a much larger proportion of uninfected herds than was found by the private tests. Of the 3,088 animals tested, 673, or 21.79 per cent., reacted, and of the 262 herds tested, but 121, or 46.18 per cent., were diseased, leaving 53.82 per cent. uninfected." The combined private and official tests gave information of 626 herds, including 11,728 animals, and showed that 61.7 per cent. of the herds and 32.26 per cent. of the cattle reacted to the tuberculin test. The cattle of New York are possibly neither better nor worse than those in many other states.

It is fair to assume that in many sections of the country the percentage of tuberculous cattle will average between 15 and 40.

It has been held by many that milk from tuberculous cows is not dangerous and does not contain tubercle bacilli, unless the udder is the seat of tuber-

THE RESPONSIBILITIES OF MUNICIPALITIES IN THE OHIO VALLEY FOR EPIDEMICS OF TYPHOID FEVER.*

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When a country, or any part thereof, becomes, so to speak, a hotbed of disease, which interferes with the normal conditions of commercial activity and human progress, is it not time for a live discussion of the problem in an assembly of the people?

When the death rate from any one epidemic exceeds 10 for 100,000 population, immediate action is necessary; but in the wild pursuit of wealth, health seems to be a factor of minor importance.

The assaults that epidemic diseases have made on the sanitary breastworks of the Ohio valley municipalities in the last fifty years have met with little or no resistance. These diseases have resulted in death and disaster. Is it not the duty of the people at large, as well as that of the sanitarian, to see that this miscarriage of civil rights is remedied?

An important part of the sanitarian's knowledge is that which relates to the history of epidemic diseases which at various periods have devastated areas of an inhabited country.

In this paper the history of typhoid epidemics in the Ohio Valley will be briefly traced, in the light of a knowledge of the habits and causes and principles and methods of prevention.

From all that can be learned from older practitioners and from the literature of the times, typhoid has

21. THE JOURNAL A. M. A., May 23, 1908, p. 1665.

19. U. S. Dept. of Agriculture, Bureau of Animal Industry, Bulletin 38, 1906.

20. Bovine Tuberculosis in New York State, 1907.

* Read in the Section on Hygiene and Sanitary Science of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

existed in the Ohio Valley since the early settlements in this region. In fact, the disease was not known as typhoid at that early date, but was called typhus, malaria, cholera, enteritis and other names.

James Lind of London, England, a traveler in this country in the early part of the last century, described a disease prevalent in the Ohio and Mississippi valleys, which we know now to have been typhoid fever. Robert Dunglison, in 1844, wrote of typhoid as present in the Ohio Valley. It is strange, and altogether unfortunate that we do not possess accurate accounts of epidemics which occurred in the early settlements. We do know, however, that whole colonies were nearly depleted by certain epidemics; but the information that can be depended on with any degree of accuracy does not antedate 1850.

On account of the assumed sanitary conditions of the municipalities in the Ohio Valley, I will recite facts as they have existed, which will give an insight to the terrible situation prevailing during the last fifty years.

Typhoid is usually transmitted by the water and milk supply, though solid forms of food play an important rôle in the conveyance of this disease.

In the discussion of the water supply I shall begin at the parting of the ways. Pittsburg receives its water supply from two rivers, the Allegheny and the Monongahela. It is estimated that 150,000 people receive their supply from the Monongahela river, which, according to the city bacteriologist, is free from bacteria one-tenth of the time, owing to free sulphuric acid. This water is purified (?) by mechanical filtration. Some 350,000 people receive water from the Allegheny river. One intake of this river is located at Montrose, ten miles above the city, but the main supply, at present, is from the intake at the Brilliant pumping station, which is situated within the city limits, and exposed to sewage and mill refuse.

Dr. James F. Edwards, superintendent of the bureau of health, Pittsburg, on the occasion of the pumping of the first filtered water from the new filtration plant, Dec. 21, 1907, made a recapitulation of what he calls "Pittsburg's thirty-year epidemic of typhoid": Since 1878, 50,000 people have been stricken with typhoid in Pittsburg, and 7,615 died. In 1906 there were 5,729 cases and 608 deaths. His report further shows that one person died out of every ten who were stricken.

The above statement is certainly appalling, but the half has just been told. The towns in the immediate vicinity of Pittsburg make up a population equal to, or greater than, that of Pittsburg proper, and it is from these towns that Pittsburg draws a great portion of her office men and women and laborers in general. From the infected sources in Pittsburg they contract typhoid. These people are taken ill, and remain at their homes until they recover or die, as the case may be. Thus, conservatively speaking, the death rate from typhoid for which Pittsburg is immediately responsible, is double that mentioned by Dr. Edwards.

Dr. Matson, bacteriologist to the bureau of health, Pittsburg, stated to me that for the years 1902, 1905, and 1907 the death rate for 100,000 population was 140, 107 and 134, respectively. He stated, further, that the death rate had reached as high as 150 in other years. This figure is the highest of any city in the world for typhoid.

Should we not consider the fact that Pittsburg is also the source of the typhoid for surrounding towns, and that the rate should be placed much above 200?

As a result of an investigation by the Pittsburg authorities, it was figured that the cost of typhoid to Pittsburg for the year ended June, 1907, was \$721,436.

In 1907 there were 5,729 cases and 608 deaths. Taking Biggs' estimate on the value of human life and the expenses incidental to serious illnesses, the loss to Pittsburg was \$2,057,800. The loss since 1878, for 50,200 cases and 7,615 deaths would be \$21,462,800.

The city of Pittsburg has expended \$7,500,000 on a filtration plant up to the present time, but before it is completed this plant will scarcely supply half the demand.

According to E. E. Lanpher, assistant engineer to the bureau of water, \$12,000,000 must be spent in the next ten years to double the plant's capacity.

Mayor Guthrie says in an interview:

"The eyes of the whole country are on Pittsburg. We have the finest filtration plant in the world, and the results which are obtained here in wiping out the typhoid scourge will exercise great influence on other cities." He also remarked that the fourteenth ward commonly had more typhoid in it alone than the whole of London.

The coal fields along the Allegheny river are practically undeveloped. Large industrial concerns are being built along its banks. We can thus realize the absurdity of filtration plants with water derived from such a source. Artesian or drilled wells, if sufficient in number, could furnish pure water, or water could be obtained from mountain streams, or even lakes, and this method could not but result in a great saving of lives and dollars to this municipality.

CONDITIONS IN VARIOUS MUNICIPALITIES.

In order to be able to furnish exact data on typhoid in the Ohio Valley, I addressed a circular letter to the boards of health of twenty municipalities.

From Dr. W. E. Kerr, Steubenville, Ohio, I received the following:

"We get our water from the Ohio river, unfiltered—a blot to our fair city. Many of the better class of people drink spring water, which is carted from house to house. It is noticeable that habitual drinkers of this spring water do not get typhoid. We have no health report for 1907 or any other year, but hope to get one started soon. We are not required to report our typhoid cases to the board of health. Each physician has from one to twenty cases at all times. Typhoid fever is endemic in Steubenville, seldom epidemic. The nearest approach to an epidemic was during the winter of 1906-1907, when several hundred cases occurred. The city is never free from typhoid. The milk supply is not inspected, though probably compares favorably with that of other cities."

Dr. W. H. McLain, Wheeling, W. Va.:

"Wheeling at present has no water supply other than the Ohio river water in its natural state. A citizen's committee recently spent about \$1,800 in putting down some test wells just above the city, had water examined, and made recommendations to the council in a public meeting. Public interest in the matter is great, and I think ultimately a number of wells will be in use, with the river bed itself as a filter. We have had typhoid fever here as far back as there are any records in the office."

In the report of the department of health of the city of Wheeling for 1907 I find 39 deaths from typhoid for the 40,000 population, a decrease of 13 as compared to 1906. Typhoid is not a reportable disease in this

city, and I am of the opinion that the above figures are rather conservative. The collection of garbage is not controlled by the board of health. Vaults are inspected. Dairy farms and milk are inspected.

Dr. Mark A. Brown, Cincinnati, Ohio, forwarded a weekly report of March 20, 1908, from which I learn that up to April 1, 1907, the people of Cincinnati were for the most part drinking badly polluted water. After that date Cincinnati began to obtain water from less polluted sources, and gradually improved the supply until November, 1907, when filtered water was introduced. Reduced to figures, there were 606 cases of typhoid with 81 deaths from April 1, 1907, to Nov. 1, 1907, as against 1,407 cases with 155 deaths for the corresponding months of the previous year. Comparison of four months' pure water service with the same period of a year previous shows a reduction of 604 cases and a saving of 42 lives. An estimation is given, including 42 lives at \$1,500 each, and a saving of expense of 604 cases at \$200 each, which, on an average, would total \$183,800. The death rate for 1905, 1906 and 1907 was 155, 239 and 157, respectively. The milk supply is also inspected and examined.

As before stated, reports and statements were solicited from other Ohio river cities and towns, but I received no further replies.

I am not surprised, in view of the existing conditions, at the reluctance of the officers of the boards of health to furnish statements. In order to save the municipalities the disgrace of publicity and the officers the humiliation of reports, I will refrain from anything other than general comment.

I have tabulated the death rate for 100,000 of population in a few Ohio Valley cities and towns for the year 1902, as follows:

City.	Population.	Source of Supply.	Rate.
Dayton, Ohio	90,000	Driven wells	25
Covington, Ky.	45,000	Ohio River	35
Indianapolis	170,000	White River	41
		Driven wells and	
		White River	41
Louisville, Ky	210,000	Ohio River	48
Cincinnati	330,000	Ohio River	52
Newport, Ky.	30,000	Ohio River	65
Wheeling, W. Va.	40,000	Ohio River	52
Steubenville, Ohio	17,000	Ohio River	80

CLINICAL VARIETIES OF TYPHOID.

The clinical varieties of typhoid generally considered are:

1. Typhoid, as distinguishing the severe form;
2. Paratyphoid;
3. Abortive; here referred to according to the severity of the type, which varies between the limits of extreme mildness and extreme severity.

The majority of cases are in the first group. The patients in this group show, as a rule, profound intoxication from the onset. It is from this form of the disease that we get a high mortality rate.

The second and third groups are rare as primary affections, but more or less common in second attacks.

PROBLEM OF UNPOLLUTED WATER SUPPLY.

A problem of great magnitude is the supply of unpolluted water for the cities and towns in the Ohio Valley. So long as we have the vast population and the industrial activity in this valley, just so long will we have polluted streams. This, however, does not contraindicate an attempt to improve existing conditions, provided such improvements can be made.

The suggestions I will make apply to towns as well as cities, and are as follows:

1. Purification of sewage, and discharge of only the purified effluent into the streams. This includes also the manufacturing wastes.
 2. Disposal of excreta and garbage by cremation.
 3. Inspection of privy vaults and cesspools, and their maintenance in a sanitary condition.
 4. Inspection and examination of all well, cistern, and other waters not procured from the regular system of supply.
 5. Vigilant inspection of water service in order to insure economy in the use of water.
 6. Inspection of supply mains to remedy defects and to avoid accumulation of dirty, stagnant water.
 7. Daily examination of water from the regular system of supply.
 8. The maintenance of pure water supply whether filtered, river, lake, well, spring, or that from other sources.
 9. Legislation that will provide for a pure water supply and officials who will see to it that the laws are enforced.
 10. Literature published monthly and distributed to the people concerning contagious and infectious diseases; their cause and prevention.
 11. Weekly reports showing the exact sanitary status of the municipality.
 12. An efficient physician, assisted by a corps of experts, at the helm of each and every board of health.
- It may be argued that the river water is the only available source of water supply, but such is not the case. A pure supply may be secured from fresh water streams, springs, lakes, and artesian wells any place in the Ohio Valley at minimum expense. If we consider, for a moment, the source of water supply of Munich, Berlin, Vienna, Stockholm, Paris, London, and Brooklyn, we have a suggestion that may aid us in an endeavor to secure a pure water supply for municipalities in the Ohio Valley.

MILK SUPPLY.

Another, and most important factor, inviting attention is the milk supply. The purity of this essential food element should be provided for by an act of legislation. Examiners should be appointed to inspect dairies, and to examine all milk before it is offered for sale.

All proprietors of dairies and dealers should be held responsible for any violation of law.

The milk in Pittsburg, as in many other Ohio Valley municipalities, is to say the least, polluted. Taking into consideration a dirty dairymaid, the shipping of milk in insufficiently cleansed and non-sterilized cans, and a filthy milk depot, is it to be wondered at that the milk supply is not only inferior but often a menace to health?

CONCLUSION.

What I have said concerning the few cities mentioned, refers, in general, to all municipalities in the Ohio Valley, and indeed to many others. I have no apologies to make in behalf of Ohio Valley municipalities. They are responsible for the conditions as they exist. I regret that we do not have a better report to offer to the world.

I have the highest regard for Drs. Edwards and Matson, of Pittsburg; McLain, of Wheeling; Brown, of

Cincinnati, and others associated with them in their great work. These men have accomplished much under most adverse circumstances. They honor themselves and the cities they represent. May we have more of such men in the Ohio Valley municipalities.

624 Pittsburg Life Building.

CHOLERIFORM DIARRHEA OF COLD WEATHER —"WINTER CHOLERA."*

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Winter epidemics of bowel disturbances, characterized by an intestinal flux, have become a problem in some of our large cities during the past few months. Simulating, in some respects, in their toxemia and collapse, the symptoms engendered by the vibrio of Koch, these endemic and epidemic bowel disturbances are popularly known as "winter cholera."

It is the purpose of this paper to detail observations on recurrent epidemics of so-called "winter cholera" at Escanaba, Mich., a city of approximately 10,000 inhabitants. Escanaba is situated on Little Bay de Noc, an inlet of Green Bay. The principles evolved from the study of such epidemics will serve to explain the cause of bowel disturbances that have become in some cities a very momentous problem, taxing the ingenuity of sanitarians.

In the Sixth Annual Report of Mortality Statistics, published in 1905 by the Department of Commerce and Labor, Washington, D. C., the editor says that the highest general death rate from diarrhea and enteritis, among the minor cities of the United States in 1905, was that of Escanaba, Mich., with a death rate of 416.9 per 100,000 of population. Only four other smaller cities of the United States, as classified, had death rates exceeding 100 per 100,000 of population, from typhoid fever during the year 1905; Escanaba, in this instance, showing a death rate of 182.8 per 100,000 of population. It is then stated parenthetically that the typhoid mortality in Escanaba for 1905, although high, was much lower than the rate for 1904, which was 351.4 per 100,000 of population. These facts, as they concern a community in which "winter cholera" and "sporadic cholera" have been prevalent for a decade or more, suggest the predominance and scope of intestinal disorders in this community, a survey of which suggests itself as profitable study. Not alone as a means toward establishing the true nature of the hybrid "winter cholera," but also as it furnishes the inhabitants of the Great Lakes States an incentive for an active cooperation in the very opportune work inaugurated in the Lake Michigan Water commission. This body was recently organized, with subcommittees in the Great Lakes States, for the express purpose of studying the question of water pollution as it pertains to Lake Michigan and Great Lake cities.

SYMPTOMATOLOGY OF WINTER CHOLERA.

In the introductory paragraph I attempted, incompletely, to define the term of winter cholera, but in order

that I may give a clearer picture of the symptom complex I shall cite in a more specific way what, subjectively and objectively, characterized winter cholera in the epidemics that I shall briefly review. The symptomatology is most varied. I say varied because of the fact that the histories of many cases would conform to the average text-book description of such diseases as acute ileocolitis, or acute catarrhal dysentery, acute gastroenteritis, dysentery, Asiatic cholera, atypical typhoid and typhoid. I hesitate, therefore, to describe the symptoms of winter cholera as manifested in any one individual as being typical of the term, the scope of which will become evident as I proceed. There were present in the epidemic referred to and in epidemics prior to and since then, all gradations from the type of patient with but a very slight indisposition, and never bedridden to the extreme type in which the patient is taken suddenly sick and becomes moribund in from forty-eight to seventy-two hours, the prostration and collapse, indeed offering a very good picture of Asiatic cholera. To facilitate matters, therefore, I shall describe a few types, covering the many phases of this disturbance.

TYPES OF THE DISEASE.

TYPE 1.—Individual enjoying good health is suddenly taken with severe colicky pains; the bowel passages are increased from two to four a day. The stools are feculent, very offensive, at first semi-solid, finally watery. These attacks are of short duration, seldom extending over a period of more than forty-eight hours, at the end of which time the patient may assume his former well-being. Because of the mildness of this type of disease it seldom comes to the notice of the physician.

TYPE 2.—Individual enjoying good health is suddenly taken with feeling of malaise, nausea and bilious vomiting. With or without these acute stomach symptoms at varying intervals, sharp colicky pains and a severe diarrhea appear. The stools are feculent, but very thin and offensive, and may number from one to twenty a day. Objective symptoms are practically negative. Temperature is normal, pulse normal or slightly accelerated. The diagnosis of this condition is based on the acute onset, the characteristic gastrointestinal disturbance, and the usual course of the disease. Patient is never really incapacitated for work, resorts to home remedies, or is subjected to routine treatment of castor oil in large doses, followed by astringents and bowel antiseptics administered by his medical adviser, and is well in from twenty-four hours to three days.

TYPE 3.—This type presents a most unusual array of symptoms. The cases in the history of their onset simulate typhoid yet in their course and mortality differ materially from typhoid. Bowel symptoms vary in intensity, assuming in some few cases a dysenteric character, while in others there is constipation. Temperature in this class of cases varies from 98.6 to 104 F., is continuous but irregular, and therefore, in this respect, entirely at variance with the remittent character of typhoid. The tongue is heavily furred, showing a bright red tip and margins. Delirium in these cases is of frequent occurrence. The Widal and diazo reactions are negative.

TYPHOID MORTALITY RATE.

As these statistics, pertaining to this isolated epidemic of 1903 and 1904 are interesting, so more extended statistics on other gastrointestinal disorders, as they appeared in this community, are not alone interesting, but valuable in establishing the true relationship of winter cholera. Although the first mention of winter cholera, as a cause of death, was made in 1898, the older inhabitants of this city can readily testify to the fact that typhoid and other bowel disturbances for years previous claimed a high mortality in the symptomatology

* Read in the Section on Hygiene and Sanitary Science of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

* Because of lack of space, the article is here slightly abbreviated. In the parts omitted, Dr. Breitenbach describes the outbreaks of winter cholera in Escanaba, and gives some of the circumstances in connection with the building of the hospital sewer and the new water intake. The complete article appears in the Transactions of the Section and in the author's reprints.