

OBSERVATIONS ON CHOLERA.¹

BY J. H. MCCOLLUM, M.D.

At this time a short account of the different epidemics of cholera that have visited this country, at intervals during the past sixty years, may not be inappropriate.

In 1832 the disease crossed the ocean for the first time and entered this country by way of Grosse Island, the quarantine station for Quebec. From April 28, 1832 to June 3, 1832 there arrived at Grosse Island four cholera infected ships, namely, the ship *Constantia*, from Limerick, Ireland, which arrived April 28, 1832, the ship *Robert*, from Cork, arriving May 14th, the *Elizabeth*, from Dublin, arriving May 28th, and the brig *Currick* from Dublin, which arrived June 3d. The importation of the disease by the immigrants on these ships was the origin of an epidemic that extended to Quebec, to Montreal, up the St. Lawrence and along Lake Ontario, down Lake Champlain to Albany and New York. From New York cholera extended to Newport, Boston, Newark, N. J., Philadelphia, Baltimore, Charleston, S. C., and Washington, D. C., during the months of July and August. This epidemic spread from Chicago and St. Louis down to New Orleans. At the end of the year 1832 the United States was free from cholera.

The next epidemic occurred in 1848 and 1849. On November 9, 1848, the ship *New York* sailed from Havre with a clean bill of health, for New York, but when she was some sixteen days out cholera appeared among the steerage passengers. On her arrival at New York the ship was quarantined, and the disease did not extend to New York city. In very great contrast to the history of this ship is that of the *Swanton*, which left Havre on October 31, 1848, bound for New Orleans. Cholera appeared after she was twenty-seven days at sea. The arrival of the cholera cases on the *Swanton* was the source of an epidemic that cost New Orleans 2,500 lives. This epidemic of 1848 at New Orleans extended to St. Louis and Chicago.

The most severe epidemic of cholera that Boston has ever had was in 1849, when there were about 700 cases and 611 deaths. A hospital was established at that time on Fort Hill; the first patient was received June 29th, and the last patient was discharged on the 15th of November.

Dr. Henry G. Clark, city physician at that time, says, in his report upon the epidemic, that the cases of cholera were found chiefly among the foreigners, and that they were mostly intemperate subjects. The number of people in easy circumstances attacked with the disease was so small that they might almost be overlooked in the history of the epidemic. The general opinion of physicians in this city at that time, was against the theory of the contagious nature of the disease. Of the four physicians, four medical students and twenty-five attendants attached to the hospital, only two exhibited any symptoms of cholera, and in these the attacks were so slight as to leave the question of diagnosis in abeyance. It is a very important fact as bearing on the subject of danger to the public health in the establishment of hospitals in a city, that no case occurred on Fort Hill that could be traced directly or indirectly to infection from the hospital.

No cases occurred in the immediate vicinity of the hospital, but they were limited entirely to the houses on the northeasterly side of the hill, which were occupied by the most miserable part of the population living in the most miserable manner. At this time the disease prevailed extensively in the rear of 136 Hanover Street, Mechanics Court, Batterymarch Street, Humphrey Place, Burgess Alley, Cross, Broad, Well and Wharf Streets.

In East Boston there were quite a number of fatal cases in or near Liverpool Street, but in every instance as far as could be ascertained the cases occurred in houses which were without proper drains; while other houses in the same locality that were well drained entirely escaped. In Burgess Alley and Half-Moon Place, a part of the city in which the houses had privy vaults in a foul and filthy condition, the disease ran riot. Quite a number of the inhabitants in this locality lived in basement tenements, and this was found to be a potent factor in causing the prevalence of the disease. This epidemic, commencing in June, was practically over in Boston the latter part of September or the first of October, 1849, although the United States as a whole was not free from the disease until 1855. During this time cholera was very prevalent in India, Asia and Europe.

In 1854 there was a second epidemic of cholera in Boston. The number of deaths from this disease was 218. Although there is no published account of this epidemic, the fact that it caused considerable anxiety is evident from the report of the consulting physicians to the mayor and aldermen of the city of Boston. The text of this report is as follows:

TO THE MAYOR AND ALDERMEN OF THE CITY OF BOSTON.

Gentlemen:—In reply to the interrogatories proposed this day by the mayor to the consulting physicians of the city, the undersigned beg leave to state:

That the cholera now exists in Boston, as in most large cities in the United States, but in so limited a degree as not to be considered a general epidemic.

A careful and temperate diet, both in regard to the quantity and quality of food, an avoidance of all excesses, especially in the use of intoxicating drinks, and the observance of customary precautions such as have been repeatedly indicated by this board in former epidemics, constitute all that now occurs as necessary to be noticed in regard to the conduct of individuals.

The consulting physicians concur in the propriety of an efficient prosecution of the active sanitary precautions which are stated to be in progress in the city, and they particularly recommend, as far as possible, the filling up of stagnant pools of water with earth, the separation of the poor who reside in over-crowded tenements, and especially their removal from cellars which are damp, foul and unwholesome.

GEO. HAYWARD, }
JACOB BIGELOW, } Consulting Physicians
[Signed] Z. B. ADAMS, } of Boston.
JAMES AYER, }

Boston, July 12, 1854.

In the history of this epidemic it is interesting to note that the *Glenmanna* came to Quebec from Liverpool June 15th, having had 45 deaths from cholera during the passage. The disease extended to Niagara Falls, Buffalo, Detroit, and west of the Niagara River; but whether it came to Boston from Canada or New York or New Orleans is a matter of doubt.

The epidemic of 1866 in Boston was probably due to the arrival of the *Virginia* at New York, from

¹ Read before the Section for Clinical Medicine, Pathology and Hygiene of the Suffolk District Medical Society, September 21, 1892.

Liverpool, with 1,029 steerage passengers, having lost 38 from cholera during the passage, and having 46 sick with the disease on her arrival. From this time until November 28, 1866, six ships arrived at New York more or less infected with cholera. In Boston there were 37 cases reported during the year, of which 18 died. The first case occurred on April 5th, and the last case on November 16th. On September 16th of that year, Dr. A. A. Gould, the honored physician, the true gentleman, the man of culture, whose scientific attainments were second to none, fell a victim to the disease. The victim of the last case was the eminent and distinguished physician, Dr. W. E. Townsend, in whose death the profession suffered a great and irreparable loss.

From 1866, at various times, to 1873, cholera was prevalent in Europe. The disease did not visit Boston during this time, although epidemics of greater or less severity prevailed through the western and southern portions of the country. The disease found its entrance to this country in 1873 through New Orleans, probably by way of Hamburg or Bremen.

The epidemic of 1883 and 1884 in India, France, Italy and Spain, did not reach this country. It was during this epidemic that the well-known and important discovery of Professor Koch regarding the comma bacillus, as the cause of the disease was made. The importance of this discovery and its bearing on the prevention of epidemics of cholera cannot be overestimated.

The present epidemic in Europe, 1892, started from India, probably from Calcutta, and extended to Persia, from there to Russia, and from Russia to Hamburg, and from Hamburg, by means of immigrants, to quarantine at New York.

Dr. W. J. Simpson, the health officer of Calcutta, in his report for 1890, says, that although cholera is always prevalent to a greater or less extent in that city the year round, it does not prevail extensively until after the festival at Hurdwar on April 12th, the great bathing day. He says in his report, in describing the scene, that such a seething mass of humanity in constant motion, entering and coming out of the sacred water of the Ganges, could be seen in no other country, and reminded him of the agitation of myriads of moving creatures which one sees under a microscope in a colony of microbes. Professor Cunningham made a microscopical examination of the water and found that above the place of bathing there were very few of the comma bacilli; but at and below the place of bathing they were found in great numbers. Dr. Simpson also says: "That his study of the Hurdwar Fair confirms the view that cholera does not occur in a locality outside the endemic areas without importation; also that importation is not by the wind; and thirdly, that the danger of extension when importation has taken place, lies mainly with contaminated water. Moreover, that sanitation in its widest sense, including attention to the water-supply, to purity of air and soil, to conservancy supplemented by the adoption of measures to keep out as far as possible the disease, and in the event of such disease gaining an entrance, to isolate it promptly, is the practical safeguard against cholera." The effect of a contaminated water-supply on the causation of an epidemic of cholera, is vividly shown by a diagram in Professor Koch's report to the Imperial Board of Health on Cholera in Calcutta, in 1883. This dia-

gram shows that the disease was much more prevalent from 1865 to 1869, inclusive, when the water was taken from the Hoogly directly opposite the city, than it was from 1870 to 1874, inclusive, when the water was taken from the river twenty miles above the city, where the chances of contamination are comparatively slight. It is also a very significant fact that 500 persons who drank water from a certain cholera-contaminated well in London, were taken ill with the disease within three days.

The number of instances in which epidemics of cholera can be absolutely and directly traced to a contaminated water-supply is so great, that it is unnecessary to weary you with detailed accounts.

In the *Engineering Record* of September 3, 1892, in an editorial, written by one of our most distinguished sanitarians, appears the following statement: "That the chief risk of anything like an epidemic comes from the general water-supplies. In the recent outbreak in Paris, the cases were almost exclusively confined to those who drank polluted Seine water." In the issue of September 10th, of the same journal, the same writer says: "That the effect of 50 cases of cholera in the worst tenement district in New York City, will be as nothing in spreading the disease, in comparison with the discharge of a single cholera stool into one of the branches of the Croton, by a sick tramp."

As the comma bacillus is conceded by all scientific observers to be the cause of the train of symptoms known as cholera, it is, therefore, important to know something in a general way of the nature of this microbe. A full and extended account of Professor Koch's views on this subject appeared in the *British Medical Journal* of August 30 and September 6, 1884. Professor Koch says that the comma bacilli flourish best at temperatures between 86° and 104° F., but that they do not grow very rapidly at lower temperatures.

Various experiments have been made which show that while at 62.5° F., the comma bacilli may grow comparatively well, the growth is slow. At 60.8°, their growth seems to cease entirely, although they are not killed. A temperature of 14° F., does not absolutely kill them, but it does hinder development. When deprived of oxygen, the same effect was noticed as in a low temperature, that is to say, the bacilli were not killed, but simply that their development ceased. Under suitable conditions of warmth and moisture the comma bacilli increase very rapidly for a short time, possibly for a period of twenty-four hours, but this luxuriant growth does not last long, for after two or three days they begin to die, while other bacteria begin to increase. The same conditions are found in the intestine itself; there is a rapid multiplication at first, but when the real vegetation period, which only lasts for a short time, is over, and especially when exudation of blood into the intestine takes place, the comma bacilli disappear, and other bacteria, especially putrefaction bacteria, commence to develop in their place.

Quite a number of experiments have been made regarding the effect of the different germicides upon the life of the microbe. Alcohol, in a ten per cent. solution, stops the development of the comma bacilli only when added in a proportion of one part to ten of the nutritive fluid. As sulphate of iron is frequently used as a disinfectant in an epidemic of cholera, it is

important to recognize the fact, that it does not kill the bacilli; but it simply hinders their development. It does, however, stop putrefactive changes which would cause the death of these organisms. The use of this agent, therefore, is to be avoided in cases of cholera. Carbolic acid (one part to four hundred of the nutritive fluid), peppermint oil (one part to two thousand), sulphate of copper (one part to twenty-five hundred), quinine (one part to five thousand), corrosive sublimate (one part to one hundred thousand), possess the power of arresting the development of this microbe, and it is possible that they may absolutely cause its death. One very important point was brought out by these experiments, namely, that the comma bacilli die very easily when dried, and this may explain the fact, why epidemics of cholera disappear after a certain time. There is a very marked difference between the vitality of the specific germ of cholera, and that of small-pox. The former dies a natural death, while the latter may retain its vitality, when dried, for an indefinite period.

The arguments for and against the contagious nature of cholera are so many and so varied that more than a brief allusion to some of them would prolong this paper to an unreasonable extent. Dr. J. M. Cunningham, Health Commissioner of India, who has studied the disease where it is endemic, says emphatically that cholera is not contagious. He says, that from the record of about 8,000 attendants on cases of cholera in India, it is proved that they suffer no more than other people living in the same place. Surgeon-General Hunter, in his report on the epidemic of cholera in Egypt in 1884, expresses a decided opinion against its contagious nature. In the *Engineering Record* of September 10, 1892, the editorial writer says that patients ill with cholera can be attended, washed and lifted with very little risk, but that the discharges from the bowels are the chief, if not the only source of danger. Dr. Goodeve, who has had an extended experience with cholera in India, says that the disease does not spread from the sick to the well by any rapidly acting emanation. Lebert's views on this point are as follows, "That cholera can be spread only by contagion, that is, by germs which are carried from a diseased to a healthy person; but that these disease germs infect only comparatively rarely by intercourse or contact with cholera patients, since they possess relatively but little vitality in the air of the sick-room, and are present mostly in inconsiderable quantity. On the other hand, a certain number of the germs and a given vitality are necessary for the propagation of the disease, and these conditions are better met in fluids than in the air; hence contagion is more frequent when the germs are communicated through a fluid than when transmitted through the air."

From a study of the observations made in a recent epidemic in France, Dr. N. Mireur arrives at the following conclusions:

(1) "Cholera is not transmitted directly from the sick to the well either by contact or through the respiratory passages.

(2) "The products emanating from cholera patients, the dejections and vomited matters, contain a germ which is not immediately transmissible by itself, but which placed under favoring conditions, gives rise to a contagious principle.

(3) "Clothing and merchandise, much more than individuals, are the agents for the transportation of this principle."

From a careful study of the different authorities on this subject the general opinion seems to be:

- (1) That cholera is mildly contagious.
- (2) That the principal, if not the only, way of infection is by the alimentary canal.
- (3) That the germs of the disease are carried only a short distance, if at all, through the air.
- (4) That the great danger of infection lies in the intestinal discharges, and in the vomitus.
- (5) That contamination of the water-supply, and of food, by these discharges is the chief source of danger.
- (6) That linen or woollen fabrics soiled by cholera discharges, if excluded from air and sunlight, serve to keep alive the germs of the disease for an indefinite period.

The history of the *Swanton*, on which cholera did not appear until she had been at sea twenty-seven days, when clothing was unpacked by the passengers, and also the history of the ship *New York*, on which the disease did not manifest itself until she had been sixteen days at sea, prove the truth of the last statement. If the foregoing conclusions are correct, it necessarily follows that in order to prevent the admission of the disease to a city, and effectually to stamp it out, the following measures must be adopted:

- (1) The proper isolation of all cases of the disease, mild and severe.
- (2) The disinfection of all discharges, from the patient, by chloride of lime, or carbolic acid as recommended by the International Committee of Experts at Rome in 1885.
- (3) The most careful supervision of the water-supply and of food.
- (4) The rigid observance of all laws of hygiene in their widest sense.
- (5) The disinfection of all persons in whom there is the slightest suspicion of infection by suitable bathing, and of their effects by super-heated steam.

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THE IMPORTANCE OF PUBLIC DISINFECTING STATIONS.¹

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THERE is one point upon which I wish to say a few words — and the present emergency affords an excellent opportunity to enforce its importance with more than usual energy — and that is the need of a better sanitary equipment in all our large cities of this country for the carrying out of the principles of disinfection.

As at present conducted, in nearly all our large

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